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(54) Title: COLLECTIN-COMPLEMENT ACTIVATING PROTEIN CHIMERAS

(57) Abstract: The present invention relates to a fusion protein capable of activating the complement system, the fusion protein comprising a first polypeptide sequence derived from a lectin-complement pathway activating protein or a functional homologue thereof; and a second polypeptide sequence derived from a collectin or a functional homologue thereof; wherein said complement activating protein is not a collectin. A preferred fusion protein comprises amino acids of the L-ficolin sequence of figure 1 and amino acids of the MBL sequence shown in figure 2. The fusion protein is suitable for use in treatment consisting of creation, reconstitution, enhancing and/or stimulating the opsonic and/or bactericidal activity of the complement system, i.e. enhancing the ability of the immune defence to recognise and kill microbial pathogens, and accordingly, the invention relates to a medicament comprising the fusion protein, methods for producing said fusion protein and methods for treating diseases, in particular infections.

COURTESY COPY OF THE PCT APPLICATION AS ORIGINALLY FILED WITH ABSTRACT

Title

Collectin-complement activating protein chimeras

Field of invention

The present invention relates to a fusion protein capable of activating the complement system, methods for producing said fusion protein as well as pharmaceutial composition comprising said fusion protein and methods for treating diseases, in particular infections, with said fusion protein.

Background of invention

Animals have developed different complex strategies to protect themselves against infections. The immune responses can be divided into to main groups, the adaptive immune response, in which an adaptation has taken place and in which cells play a dominant part and the innate immune response, which is available instantly and which primarily is based on molecules present in the body fluids. The innate immune system is operational at time of birth, in contrast to the adaptive immune defence which only during infancy obtains its full power of protecting the body (Janeway *et al.*, 1999).

Bacteria entering the body at mucosal surfaces or through broken skin are immediately recognised by collectins, a family of soluble proteins that recognise distinctive carbohydrate configurations that are present on the surfaces of microbes and absent from the cells of the multicellular organism. Collectins thus belong to the large and diverse group of pattern recognition receptors of the innate immune system. In humans, three collectins are known, although others may exist: cows for example have more. Collectins target the particles to which they bind either for uptake by phagocytes or for activation of the complement cascade, and in these ways can mediate their destruction.

Collectins all exhibit the following architecture: they have an N-terminal cysteine-rich region that appears to form inter-chain disulfide bonds, followed by a collagen-like region, an α-helical coiled-coil region and finally a C-type lectin domain which is the pattern-recognizing region and is referred to as the carbohydrate recognition domain

(CRD). The name collectin is derived from the presence of both collagen and lectin domains. The α-helical coiled-coil region initiates trimerisation of the individual polypetides to form collagen triple coils, thereby generating collectin subunits each consisting of 3 individual polypeptides, whereas the N-terminal region mediates formation of oligomers of subunits. Different collectins exhibit distinctive higher order structures, typically either tetramers of subunits or hexamers of subunits. The grouping of large numbers of binding domains allows collectins to bind with high avidity to microbial cell walls, despite a relatively low intrinsic affinity of each individual CRD for carbohydrates.

C-type CRDs are found in proteins with a widespread occurrence, both in phylogenetic and functional perspective. The different CRDs of the different collectins enable them to recognise a range of distinct microbial surface components exposed on different microorganisms. The terminal CRDs are distributed in such a way that all three domain target surfaces that present binding sites has a spacing of approximately 53 Å (Sheriff *et al.*, 1994; Weis & Drickamer, 1994). This property of 'pattern recognition' may contribute further to the selectively binding of microbial surfaces. The collagenous region or possibly the N-terminal tails of the collectins, are recognised by specific receptors on phagocytes, and is the binding site for associated proteases that are activated to initiate the complement cascade upon binding of the CRD domain to a target.

Mannan-binding lectin (MBL) also termed mannose-binding lectin or mannose binding protein is a collectin which has gained great interest as an important part of the innate immune system. MBL binds to specific carbohydrate structures found on the surface of a range of microorganisms including bacteria, yeast, parasitic protozoa and viruses, and has been found to exhibit antibacterial activity through killing mediated by activation of the terminal, lytic complement components or through promotion of phagocytosis. MBL deficiency is associated with susceptibility to frequent infections by a variety of microorganisms in childhood, and possibly also in adults.

The CRD of MBL recognises preferentially hexoses with equatorial 3- and 4-OH groups, such as mannose, glucose, *N*-acetylmannosamin and *N*-acetyl glucoseamin while carbohydrates which do not fulfil this sterical requirement, such as galactose and D-fucose, are not bound (Weis *et al.*, 1992). The carbohydrate selectivity is ob-

viously an important aspect of the self/non-self discrimination by MBL and is probably mediated by the difference in prevalence of mannose and *N*-acetyl glucoseamin residues on microbial surfaces, one example being the high content of mannose in the cell wall of yeasts such as *Saccharomyces cerevisiae* and *Candida albicans*. Carbohydrate structures in glycosylation of mammalian proteins are usually completed with sialic acid, which prevents binding of MBL to these oligomeric carbohydrates and thus prevents MBL recognition of 'self' surfaces. Also, the trimeric structure of each MBL subunit may be of importance for target recognition.

Complement is a group of proteins present in blood plasma and tissue fluid that aids the body's defences following an infection. The complement system is being activated through at least three distinct pathways, designated the classical pathway, the alternative pathway, and the MBLectin pathway (Janeway *et al.*, 1999). The classical pathway is initiated when complement factor 1 (C1) recognises surface-bound immunoglobulin. The C1 complex is composed of two proteolytic enzymes, C1r and C1s, and a non-enzymatic part, C1q, which contains immunoglobulin-recognising domains. C1q and MBL shares structural features, both molecules having a bouquet-like appearance when visualised by electron microscopy. Also, like C1q, MBL is found in complex with two proteolytic enzymes, the mannan-binding lectin associated proteases (MASP). The three pathways all generate complement factor 3 (C3) convertase, which ensures the binding of C3b to the surface of the activating surface, *i.e.* the targeted microbial pathogen. Conversion of C3 into surface bound C3b is pivotal in the process of eliminating the microbial pathogen by phagocytosis or lysis (Janeway *et al.*, 1999).

Certain O-antigen specific oligosaccharides of *Salmonella* have been reported to activate complement in C4-deficient guinea-pig serum and *Salmonella* serogroup C was later shown to react with MBL and hence activate complement by the MBLectin pathway, which is also termed the MBL pathway of complement activation or the lectin pathway.

It has for some time been speculated that the innate immune system may collaborate with the adaptive immune system in the generation of specific immune responses as exemplified by the antibody response after infection or vaccination. Fearon's group have shown that the attachment of the C3d fragment of complement

factor C3 onto a protein antigen through fusion by gene technology can in crease the immunogenecity of the antigen 1000 fold or more. Practical applications of this technique, or any number of modifications, are still awaited.

The importance of the complement system for normal immune responses was first suggested by Pepys, who found impaired antibody responses to sheep erythrocytes, a thymus-dependent antigen, in mice that were C3-depleted with cobra venom factor. The idea of a link between innate and adaptive immunity was supported by reports demonstrating reduced primary antibody responses to thymus dependent antigens and impaired IgM to IgG switching in patients and experimental animals with deficiencies of C4, C2 and C3. The mechanism may involve the generation of C3-derived ligands for binding of antigen or antigen-containing complexes to complement receptors on B lymphocytes or antigen-presenting cells. Thus, blocking of CR1 (CD35) and CR2 (CD21) in mice with specific anti CR1 and anti-CR2 antibodies or with soluble receptor protein reduced antibody responses to immunisation and experiments with CR1 and CR2-deficient knock-out mice show the requirement of these receptors for responses to thymus-dependent antigens. In addition, patients with leucocyte adhesion deficiency, who lack the CD11/CD18 adhesion molecule CR3, demonstrate impaired antibody responses and failure to switch from IgM to IgG. The C3-derived fragment C3d, a specific CR2 ligand, as mentioned above, show a strong dose-dependent adjuvant effect.

Deficiencies of the classical complement pathway (C1, C2, C4 and C3) are associated with infections by encapsulated bacteria. The main reason for this is probably the reduced efficiency of opsonic and bactericidal defence mechanisms caused by complement dysfunction. However, impaired immune responses to polysaccharide antigens might also be considered. The influence of complement on responses to thymus-independent antigens has not been extensively studied, and the available information is contradictory. Thus, low antibody responses to thymus-independent antigens have been clearly documented in C3-depleted mice and C3-deficient dogs. On the other hand, some reports find that C3-deficient patients appear to respond normally to immunisation with polysaccharide vaccines.

Ficolins, like MBL, are lectins that contain a collagen-like domain. Unlike MBL, however, they have a fibrinogen-like domain, which is similar to fibrinogen β- and γ-

chains. Ficolins also forms oligomers of structural subunits, each of which is composed of three identical 35 kDa polypeptides. Each subunit is composed of an amino-terminal, cysteine-rich region; a collagen-like domain that consists of tandem repeats of Gly-Xaa-Yaa triplet sequences (where Xaa and Yaa represent any amino acid); a neck region; and a fibrinogen-like domain. The oligomers of ficolins comprises two or more subunits, especially a tetrameric form of ficolin has been observed.

Some of the ficolins triggers the activation of the complement system substantially in similar way as done by MBL. This triggering of the complement system results in the activation of novel serine proteases (MASPs) as described above.

The fibrinogen-like domain of several lectins has a similar function to the CRD of C-type lectins including MBL, and hereby function as pattern-recognition receptors to discriminate pathogens from self.

Serum ficolins have a common binding specificity for GlcNAc (N-acetyl-glucosamine), elastin or GalNAc (N-acetyl-galactosamine). The fibrinogen-like domain is responsible for the carbohydrate binding. In human serum, two types of ficolin, known as L-ficolin (P35, ficolin L, ficolin 2 or hucolin) and H-ficolin (Hakata antigen, ficolin 3 or thermolabile b2-macroglycoprotein), have been identified, and both of them have lectin activity. L-ficolin recognises GlcNAc and H-ficolin recognises GalNAc. Another ficolin known as M-ficolin (P35-related protein, Ficolin 1 or Ficolin A) is not considered to be a serum protein and is found in leucocytes and in the lungs. L-ficolin and H-ficolin activate the lectin-complement pathway in association with MASPs. M-Ficolin, L-ficolin and H-ficolin has calcium-independent lectin activity.

MASPs (MBL-associated serine proteases) comprising MASP-1, MASP-2 and MASP-3 are proteolytic enzymes that are responsible for activation of the lectin pathway. The overall structure of MASPs resembles that of the two proteolytic components of the first factor in the classical complement pathway, C1r and C1s. The lectin pathway is initiated when MBL or a ficolin associated with MASP-1, MASP-2, MASP-3 and sMAP binds to a carbohydrate structure of the surfaces of e.g. bacteria, yeast, parasitic protoxoa, viruses. MASP-2 is the enzyme component that – like

C1s in the classical pathway – cleaves the complement components C4 and C2 to form the C3 convertase C4bC2a, which is common to both the lectin- and classical-pathway activation routes.

MASP-1, MASP-2, MASP-3 and sMAP are encoded by two genes; sMAP is a truncated form of MASP-2, and MASP-3 is produced from the MASP-1 gene by alternative splicing. The MASP-1 gene has an H-chain-encoding region that is common to MASP-1 and MASP-3, which is followed by tandem repeats of protease-domain-encoding regions that are specific to MASP-3 and MASP-1.

The MASP family can be divided into two phylogenetic lineages – TCN-type and AGY-type lineages. The TCN-type lineage, which includes MASP-1, has a TCN codon (where N denotes A, G, C or T) that encodes the active-site serine, the presence of a histidine-loop disulphide bridge and split exons. By contrast, the AGY-type lineage, which includes MASP-2, MASP-3, C1r and C1s, is characterised by an AGY codon (where Y denotes C or T) that encodes the active-site serine, the absence of a histidine-loop and a single exon.

MASP-1, MASP-2, MASP-3, C1r and C1s consist or six domains: two C1r/C1s/Uegf/bone morphogenetic protein 1 (CUB) domains; an epidermal growth factor (EGF)-like domain; two complement control protein (CCP) domains or short consensus repeats (SCRs), and a serine-protease domain. Histidine (H), aspartic acid (D) and serine (S) residues are essential for the formation of the active centre in the serine-protease domain. Only MASP-1 has two additional cysteine residues in a light chain, which form a histidine.loop disulphide bridge (S-S), as is found in trypsin and chymotrypsin. On binding of MBL and ficolins to carbohydrate on the surface of a pathogen, the pro-enzyme form of a MASP is cleaved between the second CCP and the protease domain, which results in an active form that consists of two polypeptides – heavy and light chains (also known as A and B chains).

Summary of invention

The present invention relates to fusion proteins capable of activating the complement system. Accordingly, the present invention relates to a fusion protein comprising

a first polypeptide sequence derived from a lectin-complement pathway activating protein (=complement activating protein) or a functional homologue thereof; and
a second polypeptide sequence derived from a collectin or a functional homologue thereof;

wherein said complement activating protein is not a collectin.

The fusion protein is suitable for use in treatment consisting of creation, reconstitution, enhancing and/or stimulating the opsonic and/or bactericidal activity of the complement system, i.e. enhancing the ability of the immune defence to recognise and kill microbial pathogens, and accordingly, the invention relates to a medicament comprising the fusion protein.

Also, in another aspect the invention relates to a method of treatment of a clinical condition in an individual in need thereof comprising administering to said individual the fusion protein as defined above.

In another aspect the invention relates to a method of treatment or prophylaxis of a clinical condition, such as infection, in an individual in need thereof comprising administering to said individual a the fusion protein a first polypeptide sequence derived from a protein capable of forming oligomers of structural units; and
a second polypeptide sequence derived from a mannose binding lectin (MBL, wherein said first polypeptide sequence and said second peptide sequence is not derived from the same protein, and said fusion protein is capable of associating with mannose-associated serine protease (MASP). The first polypeptide sequence is preferably derived from a protein capable of forming tetramers, pentamers, and/or hexamers of a structural unit. In a preferred embodiment the first polypeptide sequence and the second polypeptide sequence are as described below.

In a further aspect the invention relates to use of the fusion protein as defined above for the preparation of a medicament for the treatment of a clinical condition in an individual in need thereof.

Furthermore the invention relates to a method for producing the fusion protein, as well as an isolated nucleic acid sequence encoding the fusion protein, a vector comprising the sequence and a cell comprising the vector.

Drawings

Figure 1 shows the sequence of L ficolin
Figure 2 shows the sequence of MBL
Figure 3 shows an example of a fusion protein
Figures 4-8 show plasmids as described in Example 1
Figure 9 shows an alignment of fusion proteins described in Example 1
Figure 10 shows two Western blots as discussed in Example 2.

Definitions

Collectins: A family of structurally related, carbohydrate-recognising proteins of innate immunity, including mannan-binding lectin (MBL) and surfactant proteins A and D. The name refers to the presence of a collagen-like region and a C-type lectin domain.

Complement: A group of proteins present in blood plasma and tissue fluid that aids the body's defences following an infection. Complement is involved in destroying foreign cells and attracting phagocytes to the area of conflict in the body.

Conjugated: An association formed between two compounds for example between an immunogenic determinant and a collectin and/or collectin homologue or between an immunogenic determinant and a saccharide. The association may be a physical association generated e.g. by the formation of a chemical bond, such as e.g. a covalent bond.

CRD: Carbohydrate recognition domain, a C-type lectin domain that is found at the C-terminus of collectins.

Immunogenic determinant: A molecule, or a part thereof, containing one or more epitopes that will stimulate the immune system of a host organism to make a secre-

tory, humoral and/or cellular antigen-specific response, or a DNA molecule which is capable of producing such an immunogen in a vertebrate.

Immune response: Response to a immunogenic composition comprising an immunogenic determinant. An immune response involves the development in the host of a cellular- and/or humoral immune response to the administered composition or vaccine in question. An immune response generally involves the action of one or more of i) the antibodies raised, ii) B cells, iii) helper T cells, iv) suppressor T cells, v) cytotoxic T cells and iv) complement directed specifically or unspecifically to an immunogenic determinant present in an administered immunogenic composition.

Lectin: Proteins that specifically bind carbohydrates.

MASP: Mannose-associated serine protease

MBL: Mannan-binding lectin or mannose-binding lectin.

Subunit complex=structural unit: complex of three individual fusion proteins, like the subunit complex discussed above for MBL and ficolins.

Detailed description of the invention

An object of the present invention is to provide a fusion protein capable of activating the complement system in order to aid in preventing or treating diseases, in particular infectious diseases.

The fusion protein is composed of

a first polypeptide sequence derived from a lectin-complement pathway activating protein (=complement activating protein) or from a functional homologue thereof; and

a second polypeptide sequence derived from a collectin or from a functional homologue thereof;

wherein said complement activating protein is not a collectin.

By combining a polypeptide sequence derived from a lectin-complement pathway activating protein and a polypeptide sequence derived from a collectin it is possible to design a fusion protein having binding affinity for a variety of carbohydrates, preferably bacterial and viral carbohydrates and at the same time having complement system activating activity.

First polypeptide sequence

The first polypeptide sequence may be derived from any lectin-complement pathway activating protein. Said lectin-complement pathway activating protein may be naturally occurring lectin-complement pathway activating protein as well as variants or homologues to said lectin-complement pathway activating proteins, wherein said variants or homologues have maintained the lectin-complement pathway activating activity.

It is preferred that the fusion protein is capable of forming subunit complexes, each consisting of 3 individual fusion proteins as defined above.

Also the first polypeptide sequence is preferably capable of forming oligomeric complexes with the first polypeptide sequence of another fusion protein, wherein said another fusion protein may be identical to the first fusion protein. Thereby an oligomeric complex of two or more fusion proteins or two or more subunit complexes may be provided, said oligomeric complex having a higher binding avidity for bacterial or viral carbohydrates than the monomeric fusion protein. In a preferred embodiment the oligomeric complex is a dimeric subunit complex, more preferably a trimeric subunit complex, more preferably a tetrameric subunit complex.

In a preferred embodiment the lectin-complement pathway activating protein is a ficolin as defined above. Said ficolin may be L-ficolin, H-ficolin or M-ficolin or variants or homologues thereof. In a preferred embodiment the lectin-complement pathway activating protein is L-ficolin.

In another embodiment the first polypeptide sequence comprises the fibrinogen domain of the lectin, and/or the neck region of a lectin, such as a ficolin or a homologue or a variant thereof.

When the first polypeptide sequence is derived from ficolin or from a variant or a homologue of ficolin, it is preferred that the first polypeptide sequence comprises the collagen-like domain from ficolin or from a variant or homologue of ficolin. In another embodiment it is preferred that the first polypeptide sequence comprises the Cystein rich domain from ficolin or from a variant or homologue of ficolin. It is even more preferred that the first polypeptide sequence comprises the collagen-like domain and the Cystein rich domain from ficolin or from a variant or homologue of ficolin.

It is more preferred that the first polypeptide sequence comprises the collagen-like domain from L-ficolin or from a variant or homologue of L-ficolin. In another embodiment it is more preferred that the first polypeptide sequence comprises the Cystein rich domain from L-ficolin or from a variant or homologue of L-ficolin. It is even more preferred that the first polypeptide sequence comprises the N-terminal region of L-ficolin including two Cystein amino acid residues.

It is even more preferred that the first polypeptide sequence comprises the collagen-like domain and the Cystein rich domain from L-ficolin or from a variant or homologue of L-ficolin.

In a particular preferred embodiment the ficolin has one of the sequences listed below with reference to their database and accession No. For each of the sequences the Cystein rich region and the collagen-like region is described.

NP_003656. ficolin 3 precursor; ficolin (collagen/fibrinogen domain-containing) 3 (Hakata antigen) [Homo sapiens] [gi:4504331]

90..299 /region_name="pfam00147, fibrinogen_C, Fibrinogen beta and gamma chains, C-terminal globular domain"
90..299 /region_name="smart00186, FBG, Fibrinogen-related domains (FReDs); Domain present at the C-termini of fibrinogen beta and gamma chains, and a variety of fibrinogen-related proteins, including tenascin and Drosophila scabrous"

1 mdllwilpsl wllllggpac lktqehpscp gpreleaskv vllpscpgap gspgekgapg

61 pqgppgppgk mgpkgepgdp vnllrcqegp rncrellsqg atlsgwyhlc lpegralpvf
121 cdmdtegggw lvfqrrqdgs vdffrswssy ragfgnqese fwlgnenlhq ltlqgnwelr
181 veledfngnr tfahyatfrl lgevdhyqla lgkfsegtag dslslhsgrp fttydadhds
241 snsncavivh gawwyascyr snlngryavs daaahkygid wasgrgvghp yrrvrmmlr

XP_116792. similar to Ficolin 2 precursor (Collagen/fibrinogen domain-containing protein 2) (Ficolin-B) (Ficolin B) (Serum lectin P35) (EBP-37) (Hucolin) (L-Ficolin) [Homo sapiens] [gi:20477458]

91..168 /region_name="pfam00147, fibrinogen_C, Fibrinogen beta and gamma chains, C-terminal globular domain"
91..168 /region_name="smart00186, FBG, Fibrinogen-related domains (FReDs); Domain present at the C-termini of fibrinogen beta and gamma chains, and a variety of fibrinogen-related proteins, including tenascin and Drosophila scabrous"

1 mgpallalsf lwtmaltedt cpamleyval nsepgmaskn psrrhglsll vvdqgpgarg
61 vrtdqgpsga dpgslelhge cpifpseqvi lthhnnypfs tedqdndrda encavhyqga
121 wwyaschlsh lngvylggar dsftnginwk sgkgnnysyk vsemkvrpt

O00602. Ficolin 1 precursor (Collagen/fibrinogen domain-containing protein 1) (Ficolin-A) (Ficolin A) (M-Ficolin) [gi:20455484]

1..29 /gene="FCN1" /region_name="Signal" /note="POTENTIAL."
30..326 /gene="FCN1" /region_name="Mature chain" /note="FICOLIN 1."
55..93 /gene="FCN1" /region_name="Domain" /note="COLLAGEN-LIKE."
133 /gene="FCN1" /region_name="Conflict" /note="T -> N (IN REF. 1)."
144..290 /gene="FCN1" /region_name="Domain" /note="FIBRINOGEN C-TERMINAL."
287 /gene="FCN1" /region_name="Conflict" /note="N -> S (IN REF. 1)."
305 /gene="FCN1" /site_type="glycosylation" /note="N-LINKED (GLCNAC...) (POTENTIAL)."

1 melsgatmar glavllvlfl hiknlpaqaa dtcpevkvvg legsdkltil rgcpglpgap
61 gpkgeagvig ergerglpga pgkagpvgpk gdrgekgmrg ekgdagqsqs catgprnckd
121 lldrgyflsg whtiylpdcr pltvlcdmdt dgggwtvfqr rmdgsvdfyr dwaaykqgfg
181 sqlgefwlgn dnihaltaqg sselrvdlvd fegnhqfaky ksfkvadeae kyklvlgafv
241 ggsagnsltg hnnnffstkd qdndvsssnc aekfqgawwy adchasnlng lylmgphesy
301 anginwsaak gykysykvse mkvrpa //

O75636. Ficolin 3 precursor (Collagen/fibrinogen domain-containing protein 3) (Collagen/fibrinogen domain-containing lectin 3 P35) (Hakata antigen) [gi:13124185]

1..21 /gene="FCN3" /region_name="Signal" /note="POTENTIAL."
22..299 /gene="FCN3" /region_name="Mature chain" /note="FICOLIN 3."
48..80 /gene="FCN3" /region_name="Domain" /note="COLLAGEN-LIKE."
50 /gene="FCN3" /site_type="hydroxylation"
53 /gene="FCN3" /site_type="hydroxylation"
59 /gene="FCN3" /site_type="hydroxylation"
65 /gene="FCN3" /site_type="hydroxylation"
68 /gene="FCN3" /site_type="hydroxylation"
77 /gene="FCN3" /site_type="hydroxylation"

119..265 /gene="FCN3" /region_name="Domain" /note="FIBRINOGEN C-TERMINAL."
189 /gene="FCN3" /site_type="glycosylation" /note="N-LINKED (GLCNAC...) (POTENTIAL)."

1 mdllwilpsl wllllggpac lktqehpscp gpreleaskv vllpscpgap gspgekgapg
61 pqgppgppgk mgpkgepgdp vnllrcqegp rncrellsqg atlsgwyhlc lpegralpvf
121 cdmdtegggw lvfqrrqdgs vdffrswssy ragfgnqese fwlgnenlhq ltlqgnwelr
181 veledfngnr tfahyatfrl lgevdhyqla lgkfsegtag dslslhsgrp fttydadhds
241 snsncavivh gawwyascyr snlngryavs daaahkygid wasgrgvghp yrrvrmmlr

XP_130120. similar to Ficolin 2 precursor (Collagen/fibrinogen domain-containing protein 2) (Ficolin-B) (Ficolin B) (Serum lectin P35) (EBP-37) (Hucolin) [Mus musculus] [gi:20823464]

59..95 /region_name="Collagen triple helix repeat (20 copies)" /note="Collagen" /db_xref="CDD:pfam01391"
59..89 /region_name="Collagen triple helix repeat (20 copies)" /note="Collagen" /db_xref="CDD:pfam01391"
60..95 /region_name="Collagen triple helix repeat (20 copies)" /note="Collagen" /db_xref="CDD:pfam01391"
60..95 /region_name="Collagen triple helix repeat (20 copies)" /note="Collagen" /db_xref="CDD:pfam01391"
60..95 /region_name="Collagen triple helix repeat (20 copies)" /note="Collagen" /db_xref="CDD:pfam01391"
60..95 /region_name="Collagen triple helix repeat (20 copies)" /note="Collagen" /db_xref="CDD:pfam01391"
60..95 /region_name="Collagen triple helix repeat (20 copies)" /note="Collagen" /db_xref="CDD:pfam01391"
61..95 /region_name="Collagen triple helix repeat (20 copies)" /note="Collagen" /db_xref="CDD:pfam01391"
61..95 /region_name="Collagen triple helix repeat (20 copies)" /note="Collagen" /db_xref="CDD:pfam01391"
61..95 /region_name="Collagen triple helix repeat (20 copies)" /note="Collagen" /db_xref="CDD:pfam01391"
103..312 /region_name="Fibrinogen beta and gamma chains, C-terminal globular domain" /note="fibrinogen_C" /db_xref="CDD:pfam00147"
103..312 /region_name="Fibrinogen-related domains (FReDs)" /note="FBG" /db_xref="CDD:smart00186"

1 malgsaalfv ltltvhaagt cpelkvldle gykqltilqg cpglpgaagp kgeagakgdr
61 gesglpgipg kegptgpkgn qgekgirgek gdsgpsqsca tgprtckell tqghfltgwy
121 tiylpdcrpl tvlcdmdtdg ggwtvfqrrl dgsvdffrdw tsykrgfgsq lgefwlgndn
181 ihalttqgts elrvdlsdfe gkhdfakyss fqiqgeaeky klilgnflgg gagdsltphn
241 nrlfstkdqd ndgstsscam gyhgawwysq chtsnlngly lrgphksyan gvnwkswrgy
301 nysckvsemk vrli

NP_056654. ficolin 2 isoform d precursor; ficolin (collagen/fibrinogen domain-containing lectin) 2 (hucolin); ficolin (collagen/fibrinogen domain-containing lectin) 2; hucolin [Homo sapiens] [gi:8051590]

39..95 /region_name="collagen-like domain"

1 meldravgvl gaatlllsfl gmawalqaad tcpevkmvgl egsdkltilr gcpglpgapg
61 dkgeagtngk rgergppgpp gkagppgpng apgepqpclt gd

NP_056653. ficolin 2 isoform c precursor; ficolin (collagen/fibrinogen domain-containing lectin) 2 (hucolin); ficolin (collagen/fibrinogen domain-containing lectin) 2; hucolin [Homo sapiens] [gi:8051588]

39..95 /region_name="collagen-like domain"
102..143 /region_name="Fibrinogen beta and gamma chains, C-terminal globular domain" /note="fibrinogen_C" /db_xref="CDD:pfam00147"
102..143 /region_name="Fibrinogen-related domains (FReDs)" /note="FBG" /db_xref="CDD:smart00186"

1 meldravgvl gaatlllsfl gmawalqaad tcpevkmvgl egsdkltilr gcpglpgapg
61 dkgeagtngk rgergppgpp gkagppgpng apgepqpclt gprtckdlld rghflsgwht
121 iylpdcrplt vlcdmdtdgg gwtvsvglgr ggqpgspggq aahlvgehtl efsillvgds
181 qr

NP_056652. ficolin 2 isoform b precursor; ficolin (collagen/fibrinogen domain-containing lectin) 2 (hucolin); ficolin (collagen/fibrinogen domain-containing lectin) 2; hucolin [Homo sapiens] [gi:8051586]

sig_peptide 1..25
mat_peptide 26..275
60..275 /region_name="FBG domain" /note="fibrinogen beta/gamma homology"
64..275 /region_name="Fibrinogen-related domains (FReDs)" /note="FBG" /db_xref="CDD:smart00186"
64..274 /region_name="Fibrinogen beta and gamma chains, C-terminal globular domain" /note="fibrinogen_C" /db_xref="CDD:pfam00147"

1 meldravgvl gaatlllsfl gmawalqaad tcpgergppg ppgkagppgp ngapgepqpc
61 ltgprtckdl ldrghflsgw htiylpdcrp ltvlcdmdtd gggwtvfqrr vdgsvdfyrd
121 watykqgfgs rlgefwlgnd nihaltaqgt selrvdlvdf ednyqfakyr sfkvadeaek
181 ynlvlgafve gsagdsltfh nnqsfstkdq dndlntgnca vmfqgawwyk nchvsnlngr
241 ylrgthgsfa nginwksgkg ynysykvsem kvrpa

NP_001994. ficolin 1 precursor; ficolin (collagen/fibrinogen domain-containing) 1 [Homo sapiens] [gi:8051584]

sig_peptide 1..27
mat_peptide 28..326
40..108 /region_name="collagen-like domain"
50..105 /region_name="Collagen triple helix repeat (20 copies)" /note="Collagen" /db_xref="CDD:pfam01391"
51..107 /region_name="Collagen triple helix repeat (20 copies)" /note="Collagen" /db_xref="CDD:pfam01391"
52..106 /region_name="Collagen triple helix repeat (20 copies)" /note="Collagen" /db_xref="CDD:pfam01391"
115..326 /region_name="FBG domain" /note="fibrinogen beta/gamma homology"
115..326 /region_name="Fibrinogen-related domains (FReDs)" /note="FBG" /db_xref="CDD:smart00186"

115..325 /region_name="Fibrinogen beta and gamma chains, C-terminal globular domain" /note="fibrinogen_C" /db_xref="CDD:pfam00147" variation 315 /db_xref="dbSNP:1128428" variation 316 /db_xref="dbSNP:1128429" variation 317 /db_xref="dbSNP:1128430"

1 melsgatmar glavllvlfl hiknlpaqaa dtcpevkvvg legsdkltil rgcpglpgap
61 gpkgeagvig ergerglpga pgkagpvgpk gdrgekgmrg ekgdagqsqs catgprnckd
121 lldrgyflsg whtiylpdcr pltvlcdmdt dgggwtvfqr rmdgsvdfyr dwaaykqgfg
181 sqlgefwlgn dnihaltaqg sselrvdlvd fegnhqfaky ksfkvadeae kyklvlgafv
241 ggsagnsltg hnnnffstkd qdndvsssnc aekfqgawwy adchasnlng lylmgphesy
301 anginwsaak gykysykvse mkvrpa

NP_004099. ficolin 2 isoform a precursor; ficolin (collagen/fibrinogen domain-containing lectin) 2 (hucolin); ficolin (collagen/fibrinogen domain-containing lectin) 2; hucolin [Homo sapiens] [gi:4758348]

sig_peptide 1..25
mat_peptide 26..313
39..95 /region_name="collagen-like domain"
98..313 /region_name="FBG domain" /note="fibrinogen beta/gamma homology"
102..313 /region_name="Fibrinogen-related domains (FReDs)" /note="FBG" /db_xref="CDD:smart00186"
102..312 /region_name="Fibrinogen beta and gamma chains, C-terminal globular domain" /note="fibrinogen_C" /db_xref="CDD:pfam00147

1 meldravgvl gaatlllsfl gmawalqaad tcpevkmvgl egsdkltilr gcpglpgapg
61 dkgeagtngk rgergppgpp gkagppgpng apgepqpclt gprtckdlld rghflsgwht
121 iylpdcrplt vlcdmdtdgg gwtvfqrrvd gsvdfyrdwa tykqgfgsrl gefwlgndni
181 haltaqgtse lrvdlvdfed nyqfakyrsf kvadeaekyn lvlgafvegs agdsltfhnn
241 qsfstkdqdn dlntgncavm fqgawwyknc hvsnlngryl rgthgsfang inwksgkgyn
301 ysykvsemkv rpa

Q9WTS8. Ficolin 1 precursor (Collagen/fibrinogen domain-containing protein 1) (Ficolin-A) (Ficolin A) (M-Ficolin) [gi:13124116]

1..22 /gene="FCN1" /region_name="Signal" /note="POTENTIAL."
23..335 /gene="FCN1" /region_name="Mature chain" /note="FICOLIN 1."
50..88 /gene="FCN1" /region_name="Domain" /note="COLLAGEN-LIKE."
152..298 /gene="FCN1" /region_name="Domain" /note="FIBRINOGEN C-TERMINAL."
271 /gene="FCN1" /site_type="glycosylation" /note="N-LINKED (GLCNAC...) (POTENTIAL)."

1 mwwpmlwafp vllclcssqa lgqesgacpd vkivglgaqd kvaviqscps fpgppgpkge
61 pgspagrger glqgspgkmg ppgskgepgt mgppgvkgek gergtasplg qkelgdalcr
121 rgprsckdll trgifltgwy tiylpdcrpl tvlcdmdvdg ggwtvfqrrv dgsinfyrdw
181 dsykrgfgnl gtefwlgndy lhlltangnq elrvdlrefq gqtsfakyss fqvsgeqeky
241 kltlgqfleg tagdsltkhn nmafsthdqd ndtnggknca alfhgawwyh dchqsnlngr
301 ylpgshesya dginwlsgrg hrysykvaem kiras

Q15485. Ficolin 2 precursor (Collagen/fibrinogen domain-containing protein 2) (Ficolin-B) (Ficolin B) (Serum lectin P35) (EBP-37) (Hucolin) (L-Ficolin) [gi:13124203]

1..25 /gene="FCN2" /region_name="Signal" /note="POTENTIAL."
26..313 /gene="FCN2" /region_name="Mature chain" /note="FICOLIN 2."
54..92 /gene="FCN2" /region_name="Domain" /note="COLLAGEN-LIKE."
131..277 /gene="FCN2" /region_name="Domain" /note="FIBRINOGEN C-TERMINAL."
240 /gene="FCN2" /site_type="glycosylation" /note="N-LINKED (GLCNAC...) (POTENTIAL)."
300 /gene="FCN2" /site_type="glycosylation" /note="N-LINKED (GLCNAC...) (POTENTIAL)."

1 meldravgvl gaatlllsfl gmawalqaad tcpevkmvgl egsdkltilr gcpglpgapg
61 dkgeagtngk rgergppgpp gkagppgpng apgepqpclt gprtckdlld rghflsgwht
121 iylpdcrplt vlcdmdtdgg gwtvfqrrvd gsvdfyrdwa tykqgfgsrl gefwlgndni
181 haltaqgtse lrvdlvdfed nyqfakyrsf kvadeaekyn lvlgafvegs agdsltfhnn
241 qsfstkdqdn dlntgncavm fqggawwyknc hvsnlngryl rgthgsfang inwksgkgyn
301 ysykvsemkv rpa

O70497. Ficolin 2 precursor (Collagen/fibrinogen domain-containing protein 2) (Ficolin-B) (Ficolin B) (Serum lectin P35) (EBP-37) (Hucolin) [gi:13124181]

<1..15 /gene="FCN2" /region_name="Signal" /note="POTENTIAL."
16..>306 /gene="FCN2" /region_name="Mature chain" /note="FICOLIN 2."
41..79 /gene="FCN2" /region_name="Domain" /note="COLLAGEN-LIKE."
130..276 /gene="FCN2" /region_name="Domain" /note="FIBRINOGEN C-TERMINAL."
299 /gene="FCN2" /site_type="glycosylation" /note="N-LINKED (GLCNAC...) (POTENTIAL)."

1 lgsaalfvlt ltvhaagtcp elkvldlegy kqltilqgcp glpgaagpkg eagakgdrge
61 sglpgipgke gptgpkgnqg ekgirgekgd sgpsqscatg prtckelltq ghfltgwyti
121 ylpdcrpmtv lcdmdtdggg wtvfqrrldg svdffrdwts ykrgfgsqlg efwlgndnih
181 alttqgtsel rvdlsdfegk hdfakyssfq iqgeaekykl ilgnflggga gdsltphnnr
241 lfstkdqdnd gstsscamgy hgawwysqch tsnlnglylr gphksyangv nwkswrgyny
301 sckvse

O70165. Ficolin 1 precursor (Collagen/fibrinogen domain-containing protein 1) (Ficolin-A) (Ficolin A) (M-Ficolin) [gi:13124179]

1..22 /gene="FCN1" /region_name="Signal" /note="POTENTIAL."
23..334 /gene="FCN1" /region_name="Mature chain" /note="FICOLIN 1."
50..88 /gene="FCN1" /region_name="Domain" /note="COLLAGEN-LIKE."
152..298 /gene="FCN1" /region_name="Domain" /note="FIBRINOGEN C-TERMINAL."
261 /gene="FCN1" /site_type="glycosylation" /note="N-LINKED (GLCNAC...) (POTENTIAL)."

1 mqwptlwafs gllclcpsqa lgqergacpd vkvvglgaqd kvvviqscpg fpgppgpkge
61 pgspagrger gfqgspgkmg pagskgepgt mgppgvkgek gdtgaapslg ekelgdtlcq
121 rgprsckdll trgifltgwy tihlpdcrpl tvlcdmdvdg ggwtvfqrrv dgsidffrdw
181 dsykrgfgnl gtefwlgndy lhlltangnq elrvdlqdfq gkgsyakyss fqvseeqeky
241 kltlgqfleg tagdsltkhn nmsfttthdqd ndansmncaa lfhgawwyhn chqsnlngry
301 lsgshesyad ginwgtgqgh hysykvaemk iras

P57756. Ficolin 2 precursor (Collagen/fibrinogen domain-containing protein 2) (Ficolin-B) (Ficolin B) (Serum lectin P35) (EBP-37) (Hucolin) [gi:13124114]

1..22 /gene="FCN2" /region_name="Signal" /note="POTENTIAL."
23..319 /gene="FCN2" /region_name="Mature chain" /note="FICOLIN 2."
48..86 /gene="FCN2" /region_name="Domain" /note="COLLAGEN-LIKE."
137..283 /gene="FCN2" /region_name="Domain" /note="FIBRINOGEN C-TERMINAL."
306 /gene="FCN2" /site_type="glycosylation" /note="N-LINKED (GLCNAC...) (POTENTIAL)."

1 mvlgsaalfv lslcvteltl haadtcpevk vldlegsnkl tilqgcpglp galgpkgeag
61 akgdrgesgl pghpgkagpt gpkgdrgekg vrgekgdtgp sqscatgprt ckelltrgyf
121 ltgwytiylp dcrpltvlcd mdtdgggwtv fqrridgtvd ffrdwtsykq gfgsqlgefw
181 lgndnihalt tqgtnelrvd ladfdgnhdf akyssfqiqg eaekyklilg nflgggagds
241 ltsqnnmlfs tkdqdndqgs sncavryhga wwysdchtsn lnglylrglh ksyangvnwk
301 swkgynysyk vsemkvrli

JC5980: ficolin-A precurs – mouse [gi:7513652]
1..21 /region_name="domain" /note="signal sequence"
50..64 /region_name="domain" /note="collagen-like"
68..106 /region_name="domain" /note="collagen-like"
123..334 /region_name="domain" /note="fibrinogen beta/gamma homology #label FBG"

1 mqwptlwafs gllclcpsqa lgqergacpd vkvvglgaqd kvvviqscpg fpgppgpkge
61 pgspagrger gfqgspgkmg pagskgepgt mgppgvkgek gdtgaapslg ekelgdtlcq
121 rgprsckdll trgifltgwy tihlpdcrpl tvlcdmdvdg ggwtvfqrrv dgsidffrdw
181 dsykrgfgnl gtefwlgndy lhlltangnq elrvdlqdfq gkgsyakyss fqvseeqeky
241 kltlgqfleg tagdsltkhn nmsfttthdqd ndansmncaa lfhgawwyhn chqsnlngry
301 lsgshesyad ginwgtgqgh hysykvaemk iras

S61517. ficolin-1 precurs- human [gi:2135116]
1..326 /note="36K HLA-cross-reactive plasma protein; hucolin, 35K"
1..22 /region_name="domain" /note="signal sequence"
52..108 /region_name="region" /note="collagen-like"
115..326 /region_name="domain" /note="fibrinogen beta/gamma homology #label FBG"
305 /site_type="binding" /note="carbohydrate (Asn) (covalent)"

1 melsgatmar glavllvlfl hiknlpaqaa dtcpevkvvg legsdkltil rgcpglpgap
61 gpkgeagvig ergerglpga pgkagpvgpk gdrgekgmrg ekgdagqsqs catgprnckd
121 lldrgyflsg whniylpdcr pltvlcdmdt dgggwtvfqr rmdgsvdfyr dwaaykqgfg
181 sqlgefwlgn dnihaltaqg sselrvdlvd fegnhqfaky ksfkvadeae kyklvlgafv
241 ggsagnsltg hnnnffstkd qdndvsssnc aekfqgawwy adchasslng lylmgphesy
301 anginwsaak gykysykvse mkvrpa

A47172. transforming growth factor-beta 1-binding protein homolog ficolin-alpha – pig [gi:423206]

112..323 /region_name="domain" /note="fibrinogen beta/gamma homology #label FBG"

1 mdtrgvaaam rplvllvafl ctaapaldtc pevkvvgleg sdklsilrgc pglpgaagpk
61 geagasgpkg gqgppgapge pgppgpkgdr gekgepgpkg esweteqclt gprtckellt
121 rghilsgwht iylpdcqplt vlcdmdtdgg gwtvfqrrsd gsvdfyrdwa aykrgfgsql
181 gefwlgndhi haltaqgtne lrvdlvdfeg nhqfakyrsf qvadeaekym lvlgafvegn
241 agdsltshnn slfttkdqdn dqyasncavl yqgawwynsc hvsnlngryl ggshgsfang
301 vnwssgkgyn ysykvsemkf rat

JC4942. ficolin-1 precursor – human [gi:2135117]

1..22 /region_name="domain" /note="signal sequence"
45..101 /region_name="region" /note="collagen-like"
108..319 /region_name="domain" /note="fibrinogen beta/gamma homology #label FBG"
111..315 /region_name="region" /note="fibrinogen-like".
298 /site_type="binding" /note="carbohydrate (Asn) (covalent)"

1 marglavllv lflhiknlpa qaadtcpevk vvglegsdkl tilrgcpglp gapgpkgeag
61 vigergergl pgapgkagpv gpkgdrgekg mrgekgdagq sqscatgprn ckdlldrgyf
121 lsgwhtiylp dcrpltvlcd mdtdgggwtv fqrrmdgsvd fyrdwaaykq gfgsqlgefw
181 lgndnihalt aqgsselrvd lvdfegnhqf akyksfkvad eaekyklvlg afvggsagns
241 ltghnnnffs tkdqdndvss sncaekfqga wwyadchasn lnglylmgph esyanginws
301 aakgykysyk vsemkvrpa

AAF44911. symbol=BG:DS00929...[gi:7287873]

1 mkscffvlfl wtllfevgqs sphtcpsgsp ngihqlmlpe eepfqvtqck ttardwiviq
61 rrldgsvnfn qswfsykdgf gdpngeffig lqklylmtre qphelfiqlk hgpgatvyah
121 fddfqvdset elyklervgk ysgtagdslr yhinkrfstf drdndesskn caaehgggww
181 fhsclsr

The first polypeptide preferably comprises at least 10, such as at least 12, for example at least 15, such as at least 20, for example at least 25, such as at least 30, for example at least 35, such as at least 40, for example at least 50 consecutive amino acid residues of the complement activating protein or of a variant or a homologue to said protein. Such a variant or homologue is preferably at least 70%, such as 80%, for example 90%, such as 95% identical to the complement activating protein.

The first polypeptide sequence of the fusion protein is preferably capable of activating the lectin-complement pathway when bound directly or indirectly to a target, such as a bacteria or a virus. In a preferred embodiment the first polypeptide sequence is capable of associating with at least one MASP protein, such as a MASP protein selected from the group consisting of MASP-1, MASP-2 and MASP-3 or functional homologues or variants hereof. In particular the first polypeptide is capable of associating with said at least one MASP protein when being part of the fusion

protein. Thereby the first polypeptide sequence is capable of providing the fusion protein with complement system activating activity.

In a particular preferred embodiment the first polypeptide sequence comprises at least the amino acid residues corresponding to 1-54 of L-ficolin sequence of Figure 1, such as 1-55 of L-ficolin sequence of Figure 1, such as 1-69 of L-ficolin sequence of Figure 1, such as 1-77 of L-ficolin sequence of Figure 1, such as 1-90 of L-ficolin sequence of Figure 1, such as 1-93 of L-ficolin sequence of Figure 1, such as 1-131 of L-ficolin sequence of Figure 1, such as 1-207 of L-ficolin sequence of Figure 1. In particular the first polypeptide sequence comprises the amino acid residues selected from: 1-55 of L-ficolin sequence of Figure 1, 1-54 of L-ficolin sequence of Figure 1, 1-50, or 1-77 of L-ficolin sequence of Figure 1. In a more preferred embodiment the first polypeptide sequence has the amino acid residues selected from: 1-55 of L-ficolin sequence of Figure 1, 1-54 of L-ficolin sequence of Figure 1, 1-50, or 1-77 of L-ficolin sequence of Figure 1. In another embodiment the first polypeptide sequence comprises at least the amino acid residues corresponding to 60-90 of L-ficolin sequence of Figure 1, such as 55-90 of L-ficolin sequence of Figure 1, such as 54-92 of L-ficolin sequence of Figure 1.

It is preferred the first polypeptide sequence and the second polypeptide sequence are selected to include the motif X-X-G-X-X-G at least 5 times, such as at least 7 times, preferably in a consecutive sequence. It is more preferred to select the first polypeptide sequence and the second polypeptide sequence so that the aforementioned motif is substituted once with the motif X-X-G-X-G. In the motifs X means any amino acid different from Glycine, and G means Glycine.

Second polypeptide sequence

The second polypeptide sequence is preferably capable of associating with one or more carbohydrates. This may be accomplished by incorporating at least the carbohydrate recognizing domain of the collectin in question. Accordingly, the second polypeptide sequence preferably comprises the CRD domain of a collectin or a homologue or a variant thereof.

Preferably the collectin is selected from the group consisting of MBL (mannose-binding lectin), SP-A (lung surfactant protein A), SP-D (lung surfactant protein D), BK (or BC, bovine conglutinin) and CL-43 (collectin-43). Most preferably the collectin is MBL.

In a particular preferred embodiment the collectin has one of the sequences listed below with reference to their database and accession No.

Collectins

SEQ ID NO: 42
Q9NPY3 Complement component C1q receptor precursor (Complement component 1, q subcomponent, receptor 1) (C1qRp) (C1qR(p)) (C1q/MBL/SPA receptor) (CD93 antigen) (CDw93) gi|21759074|sp|Q9NPY3|CD93_HUMAN[21759074]

FEATURES Location/Qualifiers source 1..652 /organism="Homo sapiens" /db_xref="taxon:9606"
gene 1..652 /gene="C1QR1" /note="CD93"
Protein 1..652 /gene="C1QR1" /product="Complement component C1q receptor precursor"
Region 1..21 /gene="C1QR1" /region_name="Signal"
Region 22..652 /gene="C1QR1" /region_name="Mature chain" /note="COMPLEMENT COMPONENT C1Q RECEPTOR."
Region 22 /gene="C1QR1" /region_name="Conflict" /note="T -> V (IN AA SEQUENCE)."
Region 24..580 /gene="C1QR1" /region_name="Domain" /note="EXTRACELLULAR (POTENTIAL)."
Region 32..174 /gene="C1QR1" /region_name="Domain" /note="C-TYPE LECTIN."
Region 36 /gene="C1QR1" /region_name="Conflict" /note="C -> T (IN AA SEQUENCE)."
Region 38..39 /gene="C1QR1" /region_name="Conflict" /note="TA -> RI (IN AA SEQUENCE)."
Region 155 /gene="C1QR1" /region_name="Conflict" /note="S -> N (IN REF. 1)."
Region 186 /gene="C1QR1" /region_name="Conflict" /note="G -> A (IN AA SEQUENCE)."
Region 260..301 /gene="C1QR1" /region_name="Domain" /note="EGF-LIKE 1."
Bond bond(264,275) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(271,285) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(287,300) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Region 302..344 /gene="C1QR1" /region_name="Domain" /note="EGF-LIKE 2."
Bond bond(306,317) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(311,328) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."

Region 318 /gene="C1QR1" /region_name="Variant" /note="V -> A. /FTId=VAR_013573."
Site 325 /gene="C1QR1" /site_type="glycosylation" /note="N-LINKED (GLCNAC...) (POTENTIAL)."
Bond bond(330,343) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Region 345..384 /gene="C1QR1" /region_name="Domain" /note="EGF-LIKE 3, CALCIUM-BINDING (POTENTIAL)."
Bond bond(349,358) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(354,367) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(369,383) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Region 385..426 /gene="C1QR1" /region_name="Domain" /note="EGF-LIKE 4, CALCIUM-BINDING (POTENTIAL)."
Bond bond(389,400) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(396,409) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(411,425) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Region 427..468 /gene="C1QR1" /region_name="Domain" /note="EGF-LIKE 5, CALCIUM-BINDING (POTENTIAL)."
Bond bond(431,443) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(439,452) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(454,467) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Region 492 /gene="C1QR1" /region_name="Conflict" /note="S -> A (IN AA SEQUENCE)."
Region 496 /gene="C1QR1" /region_name="Conflict" /note="R -> Q (IN AA SEQUENCE)."
Region 504 /gene="C1QR1" /region_name="Conflict" /note="R -> G (IN AA SEQUENCE)."
Region 541 /gene="C1QR1" /region_name="Conflict" /note="P -> S (IN REF. 1)."
Region 581..601 /gene="C1QR1" /region_name="Transmembrane region" /note="POTENTIAL."
Region 594..601 /gene="C1QR1" /region_name="Domain" /note="POLY-LEU."
Region 602..652 /gene="C1QR1" /region_name="Domain" /note="CYTOPLASMIC (POTENTIAL)."
ORIGIN 1 matsmglllI llllltqpga gtgadteavv cvgtacytah sgklsaaeaq nhcnqnggnl
61 atvkskeeaq hvqrvlaqll rreaaltarm skfwiglqre kgkcldpslp lkgfswvggg
121 edtpysnwhk elrnsciskr cvslldlsq pllpsrlpkw segpcgspgs pgsniegfvc
181 kfsfkgmcrp lalggpgqvt yttpfqttss sleavpfasa anvacgegdk detqshyflc
241 kekapdvfdw gssgplcvsp kygcnfnngg chqdcfeggd gsflcgcrpg frlddlvtc
301 asrnpcsssp crggatcvlg phgknytcrc pqgyqldssq ldcvdvdecq dspcaqecvn
361 tpggfrcecw vgyepggpge gacqdvdeca lgrspcaqgc tntdgsfhcs ceegyvlage
421 dgtqcqdvde cvgpggplcd slcfntqgsf hcgclpgwvl apngvsctmg pvslgppsgp
481 pdeedkgeke gstvpraata sptrgpegtp katpttsrps lssdapitsa plkmlapsgs
541 pgvwrepsih hataasgpqe paggdssvat qnndgtdgqk lllfyilgtv vaillllala
601 lgllvyrkrr akreekkekk pqnaadsysw vperaesram enqysptpgt dc

SEQ ID NO: 43
BAC05523 collectin placenta 1 [Mus musculus]
gi|21901969|dbj|BAC05523.1|[21901969]
FEATURES Location/Qualifiers source 1..742 /organism="Mus musculus"
/db_xref="taxon:10090" /tissue_lib="Liver"
Protein 1..742 /product="collectin placenta 1"
CDS 1..742 /gene="CL-P1" /coded_by="AB078434.1:92..2320"
ORIGIN 1 mkddfaeeee vqsfgykrfg iqegtqctkc knnwalkfsi vllyilcall titvailgyk
61 vvekmdnvtd gmetshqtyd nkltavesdl kklgdqagkk alstnselst frsdildlrq
121 qlqeitekts knkdtleklq angdslvdrq sqlketlqnn sflittvnkt lqayngyvtn
181 lqqdtsvlqg nlqsqmysqs vvimnlnnln ltqvqqrnli snlqqsvddt slaiqriknd
241 fqnlqqvflq akkdtdwlke kvqslqtlaa nnsalakann dtledmnsql ssftgqmdni
301 ttisqaneqs lkdlqdlhkd tenrtavkfs qleerfqvfe tdivniisni sytahhlrtl
361 tsnlndvrtt ctdtltrhtd dltslnntlv nirldsislr mqqdmmrskl dtevanlsvv
421 meemklvdsk hgqliknfti lqgppgprgp kgdrgsqgpp gptgnkgqkg ekgepgppgp
481 agergtigpv gppgergskg skgsqgpkgs rgspgkpgpq gpsgdpgppg
ppgkdglpgp
541 qgppgfqglq gtvgepgvpg prglpglpgv pgmpgpkgpp gppgpsgame
plalqneptp
601 asevngcpph wknftdkcyy fslekeifed aklfcedkss hlvfinsree qqwikkhtvg
661 reshwigltd seqesewkwl dgspvdyknw kagqpdnwgs ghgpgedcag li-
yagqwndf
721 qcdeinnfic ekereavpss il

SEQ ID NO: 45
AAM34742 46-kDa collectin precursor [Bos taurus]
gi|21105685|gb|AAM34742.1|AF509589_1[21105685]
sig_peptide 1..20
Region 67..245 /region_name="collagen-like region"
Region 245..371 /region_name="carbohydrate recognition domain"
CDS 1..371 /gene="CL-46" /coded_by="join(AF509589.1:1454..1652,
AF509589.1:5950..6066,AF509589.1:6402..6509,
AF509589.1:6823..6930,AF509589.1:7289..7405,
AF509589.1:8021..8104,AF509589.1:10318..10700)"
ORIGIN 1 mlllplsvll lltqpwrslg aemkiysqkt langctlvvc rppegglpgr dgqdgregpq
61 gekgdpgspg pagragrpgp agpigpkgdn gsagepgpkg dtgppgppgm pgpagregps
121 gkqgsmgppg tpgpkgdtgp kggmgapgmq gspgpaglkg ergapgelga pgsagvagpa
181 gaigpqgpsg argppglkgd rgdpgergak gesgladvna lkqrvtileg qlqrlqnafs
241 rykkavlfpd gqavgkkifk tagavksysd aqqlcreakg qlasprsaae neavaqlvra
301 knndaflsmn distegkfty ptgeslvysn wasgepnnnn agqpencvqi yregkwndvp
361 csepllvice f

SEQ ID NO: 47
XP_139613 similar to collectin sub-family member 10; collectin liver 1; collectin 34
[Mus musculus]
gi|20903807|ref|XP_139613.1|[20903807]
FEATURES Location/Qualifiers source 1..420 /organism="Mus musculus"
/strain="C57BL/6J" /db_xref="taxon:10090" /chromosome="15"
Protein 1..420 /product="similar to collectin sub-family member 10; collectin liver 1;
collectin 34"

Region 152..269 /region_name="C-type lectin (CTL) or carbohydrate-recognition domain (CRD)" /note="CLECT" /db_xref="CDD:smart00034"
Region 165..269 /region_name="Lectin C-type domain" /note="lectin_c" /db_xref="CDD:pfam00059"
Region 362..419 /region_name="Ubiquitin-conjugating enzyme E2, catalytic domain homologues" /note="UBCc" /db_xref="CDD:smart00212"
Region 363..419 /region_name="Ubiquitin-conjugating enzyme" /note="UQ_con" /db_xref="CDD:pfam00179" CDS 1..420 /gene="LOC239447" /coded_by="XM_139613.1:1..1263" /db_xref="InterimID:239447"
ORIGIN 1 mngfrvllrs nlsmllllal lhfqslgldv dsrsaaevca thtispgpkg ddgergdtge
61 egkdgkvgrq gpkgvkgelg dmgaqgnigk sgpigkkgdk gekgllgipg ekgkagticd
121 cgryrkvvgq ldisvarlkt smkfiknvia gireteekfy yivqeeknyr eslthcrirg
181 gmlampkdev vntliadyva ksgffrvfig vndleregqy vftdntplqn ysnwkeeeps
241 dpsghedcve mlssgrwndt echltmyfvs slqedliedc lreqgllvqv tpanqellfg
301 idtflgpmsc vyqrtgtkqk lysqcrlwdg lakkqtneta niatfckgae pnrgsrpcgq
361 kqemmtlmms gnkgittfpe sdnlfkwvgt mlgaagtide dlkyklslns pvvtliihpq

SEQ ID NO: 48
XP_123211 similar to collectin sub-family member 12 [Mus musculus]
gi|20876566|ref|XP_123211.1|[20876566]
FEATURES Location/Qualifiers source 1..742 /organism="Mus musculus" /strain="C57BL/6J" /db_xref="taxon:10090" /chromosome="18"
Protein 1..742 /product="similar to collectin sub-family member 12"
Region 79..320 /region_name="V-type ATPase 116kDa subunit family" /note="V_ATPase_sub_a" /db_xref="CDD:pfam01496"
Region 92..337 /region_name="Intermediate filament protein" /note="filament" /db_xref="CDD:pfam00038" Region 607..731 /region_name="C-type lectin (CTL) or carbohydrate-recognition domain (CRD)" /note="CLECT" /db_xref="CDD:smart00034"
Region 624..732 /region_name="Lectin C-type domain" /note="lectin_c" /db_xref="CDD:pfam00059"
CDS 1..742 /gene="LOC225157" /coded_by="XM_123211.1:77..2305" /db_xref="InterimID:225157"
ORIGIN 1 mkddfaeeee vqsfgykrfg iqegtqctkc knnwalkfsi vllyilcall titvailgyk
61 vvekmdnvtd gmetshqtyd nkltavesdl kklgdqagkk alstnselst frsdildlrq
121 qlqeitekts knkdtleklq angdslvdrq sqlketlqnn sflittvnkt lqayngyvtn
181 lqqdtsvlqg nlqsqmysqs vvimnlnnln ltqvqqrnli snlqqsvddt slaiqriknd
241 fqnlqqvflq akkdtdwlke kvqslqtlaa nnsalakann dtledmnsql ssftgqmdni
301 ttisqaneqs lkdlqdlhkd tenrtavkfs qleerfqvfe tdivniisni sytahhlrtl
361 tsnlndvrtt ctdtltrhtd dltslnntlv nirldsislr mqqdmmrskl dtevanlsvv
421 meemklvdsk hgqliknfti lqgppgprgp kgdrgsqgpp gptgnkgqkg ekgepgppgp
481 agergtigpv gppgergskg skgsqgpkgs rgspgkpgpq gpsgdpgppg ppgkdglpgp
541 qgppgfqglq gtvgepgvpg prglpglpgv pgmpgpkgpp gppgpsgame plalqneptp
601 asevngcpph wknftdkcyy fslekeifed aklfcedkss hlvfinsree qqwikkhtvg
661 reshwigltd seqesewkwl dgspvdyknw kagqpdnwgs ghgpgedcag li-yagqwndf
721 qcdeinnfic ekereavpss il

SEQ ID NO: 49
NP_571645 mannose binding-like lectin [Danio rerio]
gi|18858997|ref|NP_571645.1|[18858997]
sig_peptide 1..23

mat_peptide 24..251 /product="mannose binding-like lectin"
Region 24..36 /region_name="N-terminal segment"
Region 33..70 /region_name="Collagen triple helix repeat (20 copies)"
/note="Collagen" /db_xref="CDD:pfam01391"
Region 33..70 /region_name="Collagen triple helix repeat (20 copies)"
/note="Collagen" /db_xref="CDD:pfam01391"
Region 37..101 /region_name="collagen-like structure"
Region 37..70 /region_name="Collagen triple helix repeat (20 copies)"
/note="Collagen" /db_xref="CDD:pfam01391"
Region 71..74 /region_name="break in collagen structure"
Region 102..132 /region_name="neck region"
Region 133..251 /region_name="carbohydrate recognition domain" /note="CRD"
Region 134..247 /region_name="C-type lectin (CTL) or carbohydrate-recognition
domain (CRD)" /note="CLECT" /db_xref="CDD:smart00034"
Region 146..247 /region_name="Lectin C-type domain" /note="lectin_c"
/db_xref="CDD:pfam00059"
CDS 1..251 /gene="mbl" /coded_by="NM_131570.1:68..823" /note="collectin with
structural homology to mannose-binding lectin but with a predicted carbohydrate
specificity for galactose;mannose binding-like lectin" /db_xref="LocusID:58091"
ORIGIN 1 mallklflga llllqlvlql magaadpqsl ncpayagvpg tpghnglpgr dgrvgrdgan
61 gpkgekgepg vnvqgppgka gppgpagakg ergpsglpgq dcmsdslkse lqklsdkial
121 iekvvnfktf kkvgqkyyvt ddveetfdkg mqycssngga lvlprtleen allkvfvssa
181 fkrlfiritd rekegefvdt drkkltftnw gpnqpdnykg aqdcgaiads glwddvscds
241 lypiiceiei k

SEQ ID NO: 50
NP_569057 collectin sub-family member 12, isoform I; scavenger receptor with C-type lectin; collectin placenta 1 [Homo sapiens]
gi|18641360|ref|NP_569057.1|[18641360]

FEATURES Location/Qualifiers source 1..742 /organism="Homo sapiens" /db_xref="taxon:9606" /chromosome="18" /map="18pter-p11.3"
Protein 1..742 /product="collectin sub-family member 12, isoform I" /note="isoform I is encoded by transcript variant I; scavenger receptor with C-type lectin; collectin placenta 1"
Region 79..328 /region_name="V-type ATPase 116kDa subunit family" /note="V_ATPase_sub_a" /db_xref="CDD:pfam01496" Region 443..589 /region_name="collagen-like domain"
Region 607..731 /region_name="C-type lectin (CTL) or carbohydrate-recognition domain (CRD)" /note="CLECT" /db_xref="CDD:smart00034"
Region 624..732 /region_name="Lectin C-type domain" /note="lectin_c" /db_xref="CDD:pfam00059"
Region 668..719 /region_name="Beta-lactamase" /note="beta-lactamase" /db_xref="CDD:pfam00144"
CDS 1..742 /gene="COLEC12" /coded_by="NM_130386.1:172..2400" /db_xref="LocusID:81035"
ORIGIN 1 mkddfaeeee vqsfgykrfg iqegtqctkc knnwalkfsi illyilcall titvailgyk
61 vvekmdnvtg gmetsrqtyd dkltavesdl kklgdqtgkk aistnselst frsdildlrq
121 qlreitekts knkdtlekiq asgdalvdrq sqlketlenn sflittvnkt lqayngyvtn
181 lqqdtsvlqg nlqnqmyshn vvimnlnnln ltqvqqrnli tnlqrsvddt sqaiqriknd
241 fqnlqqvflq akkdtdwlke kvqslqtlaa nnsalakann dtledmnsql nsftgqmeni
301 ttisqaneqn lkdlqdlhkd aenrtaikfn qleerfqlfe tdivniisni sytahhlrtl
361 tsnlnevrtt ctdtltkhtd dltslnntla nirldsvslr mqqdlmrsrl dtevanlsvi
421 meemklvdsk hgqliknfti lqgppgprgp rgdrgsqgpp gptgnkgqkg ekgepgppgp
481 agergpigpa gppgerggkg skgsqgpkgs rgspgkpgpq gpsgdpgppg ppgkeglpgp
541 qgppgfqglq gtvgepgvpg prglpglpgv pgmpgpkgpp gppgpsgavv plalqneptp
601 apedngcpph wknftdkcyy fsvekeifed aklfcedkss hlvfintree qqwikkqmvg
661 reshwigltd serenewkwl dgtspdyknw kagqpdnwgh ghgpgedcag liyagqwndf
721 qcedvnnfic ekdretvlss al

SEQ ID NO: 51
NP_110408 collectin sub-family member 12, isoform II; scavenger receptor with C-type lectin; collectin placenta 1 [Homo sapiens]
gi|18641358|ref|NP_110408.2|[18641358]
FEATURES Location/Qualifiers source 1..622 /organism="Homo sapiens" /db_xref="taxon:9606" /chromosome="18" /map="18pter-p11.3"
Protein 1..622 /product="collectin sub-family member 12, isoform II" /note="isoform II is encoded by transcript variant II; scavenger receptor with C-type lectin; collectin placenta 1"
Region 79..328 /region_name="V-type ATPase 116kDa subunit family" /note="V_ATPase_sub_a" /db_xref="CDD:pfam01496"
Region 443..589 /region_name="collagen-like domain"
CDS 1..622 /gene="COLEC12" /coded_by="NM_030781.2:172..2040" /db_xref="LocusID:81035"
ORIGIN 1 mkddfaeeee vqsfgykrfg iqegtqctkc knnwalkfsi illyilcall titvailgyk
61 vvekmdnvtg gmetsrqtyd dkltavesdl kklgdqtgkk aistnselst frsdildlrq
121 qlreitekts knkdtlekiq asgdalvdrq sqlketlenn sflittvnkt lqayngyvtn

181 lqqdtsvlqg nlqnqmyshn vvimnlnnln ltqvqqrnli tnlqrsvddt sqaiqriknd
241 fqnlqqvflq akkdtdwlke kvqslqtlaa nnsalakann dtledmnsql nsftgqmeni
301 ttisqaneqn lkdlqdlhkd aenrtaikfn qleerfqlfe tdivniisni sytahhlrtl
361 tsnlnevrtt ctdtltkhtd dltslnntla nirldsvslr mqqdlmrsrl dtevanlsvi
421 meemklvdsk hgqliknfti lqgppgprgp rgdrgsqgpp gptgnkgqkg ekgepgppgp
481 agergpigpa gppgerggkg skgsqgpkgs rgspgkpgpq gpsgdpgppg ppgkeglpgp
541 qgppgfqglq gtvgepgvpg prglpglpgv pgmpgpkgpp gppgpsgavv plalqneptp
601 apednskskp slqpggqgsa ca

SEQ ID NO: 52
NP_569716 collectin sub-family member 12 [Mus musculus]
gi|18485494|ref|NP_569716.1|[18485494]
FEATURES Location/Qualifiers source 1..742 /organism="Mus musculus"
/db_xref="taxon:10090"
Protein 1..742 /product="collectin sub-family member 12"
Region 79..320 /region_name="V-type ATPase 116kDa subunit family"
/note="V_ATPase_sub_a" /db_xref="CDD:pfam01496"
Region 607..731 /region_name="C-type lectin (CTL) or carbohydrate-recognition domain (CRD)" /note="CLECT" /db_xref="CDD:smart00034"
Region 629..732 /region_name="Lectin C-type domain" /note="lectin_c"
/db_xref="CDD:pfam00059"
CDS 1..742 /gene="Colec12" /coded_by="NM_130449.1:77..2305"
/db_xref="LocusID:140792" /db_xref="MGD:2152907"
ORIGIN 1 mkddfaeeee vqsfgykrfg ihegtqctkc innwalkfsi vllyilcall titvailgyk
61 vvekmdnvsd gmetshqtyd nkltavesdl kklgdqagkk alstnselst frsdildlrq
121 qlqeitekts knkdtleklq angdslvdrq sqlketlqnn sflittvnkt lqayngyvtn
181 lqqdtnvlqg nlqsqmysqs vvimnlnnln ltqvqqrnli snlqqsvddt slaiqriknd
241 fqnlqqvflq akkdtdwlke kvqslqtlaa nnsalakann dtledmnsql ssftgqmdni
301 ttisqaneqs lkdlqdlhkd tenrtavkfs qleerfqvfe tdivniisni sytahhlrtl
361 tsnlndvwtt ctdtltrhtd dltslnntlv nirldsislr mqqdmmrskl dtevanlsvv
421 meemklvdsk hgqliknfti lqgppgprgp kgdrgsqgpp gptgnkgqkg ekgepgppgp
481 agergtigpv gppgergskg skgsqgpkgs rgspgkpgpq gpsgdpgppg ppgkdglpgp
541 qgppgfqglq gtvgepgvpg prglpglpgv pgmpgpkgpp gppgpsgame plalqneptp
601 asevngcpph wknftdkcyy fslekeiled aklfcedkss hlvfinsree qqwikkhtvg
661 reshwigltd seqesewkwl dgspvdyknw kagqpdnwgs ghgpgedcag li-yagqwndf
721 qcdeinnfic ekereavpss il

SEQ ID NO: 53
AAL61856 43kDa collectin precursor [Bos taurus]
gi|18252111|gb|AAL61856.1|[18252111]

FEATURES Location/Qualifiers source 1..321 /organism="Bos taurus"
/db_xref="taxon:9913"
Protein 1..321 /product="43kDa collectin precursor" /name="CL-43; conglutinin; SP-D"
Region 1..166 /region_name="collagen-like"
Region 167..193 /region_name="alpha-helical neck"
Region 195..321 /region_name="carbohydrate-recognition domain"

CDS 1..321 /gene="CL43" /coded_by="join(AY071822.1:2945..3143,
AY071822.1:5843..5950,AY071822.1:6273..6344,
AY071822.1:6734..6850,AY071822.1:7039..7122, AY071822.1:9525..9910)"
ORIGIN 1 mlplplsill lltqsqsflg eemdvysekt ltdpctlvvc appadslrgh dgrdgkegpq
61 gekgdpgppg mpgpagregp sgrqgsmgpp gtpgpkgepg peggvgapgm
pgspgpaglk
121 gergtpgpgg aigpqgpsga mgppglkgdr gdpgekgarg etsvlevdtl rqrmrnlege
181 vqrlqnivtq yrkavlfpdg qavgekifkt agavksysda eqlcreakgq lasprssaen
241 eavtqlvrak nkhaylsmnd iskegkftyp tggsldysnw apgepnnrak degpenclei
301 ysdgnwndie creerlvice f

SEQ ID NO: 44
AAL61855 43kDa collectin precursor [Bos taurus]
gi|18252109|gb|AAL61855.1|[18252109]

FEATURES Location/Qualifiers source 1..321 /organism="Bos taurus"
/db_xref="taxon:9913" /tissue_type="liver" Protein 1..321 /product="43kDa collectin
precursor" /name="CL-43; conglutinin; SP-D"
CDS 1..321 /gene="CL43" /coded_by="AY071821.1:172..1137"
ORIGIN 1 mlplplsill lltqsqsflg eemdvysekt ltdpctlvvc appadslrgh dgrdgkegpq
61 gekgdpgppg mpgpagregp sgrqgsmgpp gtpgpkgepg peggvgapgm
pgspgpaglk
121 gergtpgpgg aigpqgpsga mgppglkgdr gdpgekgarg etsvlevdtl rqrmrnlege
181 vqrlqnivtq yrkavlfpdg qavgekifkt agavksysda eqlcreakgq lasprssaen
241 eavtqlvrak nkhaylsmnd iskegkftyp tggsldysnw apgepnnrak degpenclei
301 ysdgnwndie creerlvice f

SEQ ID NO: 46
BAB22581 data source:SPTR, source key:Q9Y6Z7, evidence:ISS~homolog to
COLLECTIN 34~putative [Mus musculus] gi|12833584|dbj|BAB22581.1|[12833584]

FEATURES Location/Qualifiers source 1..272 /organism="Mus musculus"
/strain="C57BL/6J" /db_xref="FANTOM_DB:1010001H16"
/db_xref="MGD:1904296" /db_xref="taxon:10090" /clone="1010001H16"
/sex="male" /tissue_type="heart" /clone_lib="RIKEN full-length enriched mouse
cDNA library" /dev_stage="adult"
Protein 1..272 /name="data source:SPTR, source key:Q9Y6Z7, evidence:ISS ho-
molog to COLLECTIN 34 putative" CDS 1..272 /coded_by="AK003121.1:81..899"
/db_xref="MGD:1918943"
ORIGIN 1 mmmrdlalag mlislaflsl lpsgcpqqtt edacsvqilv pglkgdagek gdkgapgrpg
61 rvgptgekgd mgdkgqkgtv grhgkigpig akgekgdsgd igppgpsgep gipcecsqlr
121 kaigemdnqv tqlttelkfi knavagvret eskiyllvke ekryadaqls cqarggtlsm
181 pkdeaanglm asylaqagla rvfigindle kegafvysdr spmqtfnkwr sgepnnayde
241 edcvemvasg gwndvachit myfmcefdke nl

SEQ ID NO: 54
NP_034905 mannose binding lectin, liver (A) [Mus musculus]
gi|6754654|ref|NP_034905.1|[6754654]
FEATURES Location/Qualifiers source 1..239 /organism="Mus musculus"
/db_xref="taxon:10090" /chromosome="14" /map="14 15.0 cM"
Protein 1..239 /product="mannose binding lectin, liver (A)"
misc_feature 19..239 /partial /note="mature protein based on homology to rat MPB-
A"

Region 126..236 /region_name="C-type lectin (CTL) or carbohydrate-recognition domain (CRD)" /note="CLECT" /db_xref="CDD:smart00034"
Region 135..237 /region_name="Lectin C-type domain" /note="lectin_c" /db_xref="CDD:pfam00059"
CDS 1..239 /gene="Mbl1" /coded_by="NM_010775.1:121..840" /db_xref="LocusID:17194" /db_xref="MGD:96923"
ORIGIN 1 mlllpllpvl lcvvsvsssg sqtcedtlkt csviacgrdg rdgpkgekge pgqglrglqg
61 ppgklgppgs vgspgspgpk gqkgdhgdnr aieeklanme aeirilkskl qltnklhafs
121 mgkksgkklf vtnhekmpfs kvkslctelq gtvaiprnae enkaiqevat giaflgitde
181 ategqfmyvt ggrltysnwk kdepnnhgsg edcviildng lwndiscqas fkavcefpa

SEQ ID NO: 55
NP_034906 mannose binding lectin, serum (C) [Mus musculus] gi|6754656|ref|NP_034906.1|[6754656]
sig_peptide 1..18
Region 120..241 /region_name="C-type lectin (CTL) or carbohydrate-recognition domain (CRD)" /note="CLECT" /db_xref="CDD:smart00034"
Region 140..242 /region_name="Lectin C-type domain" /note="lectin_c" /db_xref="CDD:pfam00059"
CDS 1..244 /gene="Mbl2" /coded_by="NM_010776.1:177..911" /note="polysaccharide-binding component of RaRF; sequence similarity to mannose-binding proteins" /db_xref="LocusID:17195" /db_xref="MGD:96924" ORIGIN 1
msiftsflll cvvtvvyaet ltegvqnscp vvtcsspgln gfpgkdgrdg akgekgepgq
61 glrglqgppg kvgptgppgn pglkgavgpk gdrgdraefd tseidseiaa lrselralrn
121 wvlfslsekv gkkyfvssvk kmsldrvkal csefqgsvat prnaeensai qkvakdiayl
181 gitdvrvegs fedltgnrvr ytnwndgepn ntgdgedcvv ilgngkwndv pcsdsflaic
241 efsd

SEQ ID NO: 56
NP_006429 collectin sub-family member 10; collectin liver 1; collectin 34 [Homo sapiens] gi|5453619|ref|NP_006429.1|[5453619]
FEATURES Location/Qualifiers source 1..277 /organism="Homo sapiens" /db_xref="taxon:9606" /chromosome="8" /map="8q23-q24.1"
Protein 1..277 /product="collectin sub-family member 10" /note="collectin liver 1; collectin 34"
Region 152..271 /region_name="C-type lectin (CTL) or carbohydrate-recognition domain (CRD)" /note="CLECT" /db_xref="CDD:smart00034"
Region 165..272 /region_name="Lectin C-type domain" /note="lectin_c" /db_xref="CDD:pfam00059"
CDS 1..277 /gene="COLEC10" /coded_by="NM_006438.2:76..909" /db_xref="LocusID:10584"
ORIGIN 1 mngfaslirr nqfillvlfl lqiqslgldi dsrptaevca thtispgpkg ddgekgdpge
61 egkhgkvgrm gpkgikgelg dmgdrgnigk tgpigkkgdk gekgllgipg ekgkagtvcd
121 cgryrkfvgq ldisiarlkt smkfvknvia gireteekfy yivqeeknyr eslthcrirg
181 gmlampkdea antliadyva ksgffrvfig vndleregqy mftdntplqn ysnwnegeps
241 dpyghedcve mlssgrwndt echltmyfvc efikkkk

SEQ ID NO: 57
BAB72147 collectin placenta 1 [Homo sapiens] gi|17026101|dbj|BAB72147.1|[17026101]
FEATURES Location/Qualifiers source 1..742 /organism="Homo sapiens" /db_xref="taxon:9606" /sex="female" /tissue_lib="placenta"
Protein 1..742 /product="collectin placenta 1"

CDS 1..742 /gene="CL-P1" /coded_by="AB005145.1:71..2299"

ORIGIN 1 mkddfaeeee vqsfgykrfg iqegtqctkc knnwalkfsi illyilcall titvailgyk
61 vvekmdnvtg gmetsrqtyd dkltavesdl kklgdqtgkk aistnselst frsdildlrq
121 qlreitekts knkdtleklq asgdalvdrq sqlketlenn sflittvnkt lqayngyvtn
181 lqqdtsvlqg nlqnqmyshn vvimnlnnln ltqvqqrnli tnlqrsvddt sqaiqriknd
241 fqnlqqvflq akkdtdwlke kvqslqtlaa nnsalakann dtledmnsql nsftgqmeni
301 ttisqaneqn lkdlqdlhkd aenrtaikfn qleerfqlfe tdivniisni sytahhlrtl
361 tsnlnevrtt ctdtltkhtd dltslnntla nirldsvslr mqqdlmrsrl dtevanlsvi
421 meemklvdsk hgqliknfti lqgppgprgp rgdrgsqgpp gptgnkgqkg ekgepgppgp
481 agergpigpa gppgerggkg skgsqgpkgs rgspgkpgpq gpsgdpgppg ppgkeglpgp
541 qgppgfqglq gtvgepgvpg prglpglpgv pgmpgpkgpp gppgpsgavv plalqneptp
601 apedngcpph wknftdkcyy fsvekeifed aklfcedkss hlvfintree qqwikkqmvg
661 reshwigltd serenewkwl dgtspdyknw kagqpdnwgh ghgpgedcag liyagqwndf
721 qcedvnnfic ekdretvlss al

SEQ ID NO: 58
AAF63470 mannose binding-like lectin precursor [Carassius auratus]
gi|7542474|gb|AAF63470.1|AF227739_1[7542474]
sig_peptide <1..13
Region 14..25 /region_name="N-terminal segment"
Region 26..93 /region_name="collagen-like structure"
Region 60..63 /region_name="break in collagen structure"
Region 94..124 /region_name="neck region" Region 125..246
/region_name="carbohydrate recognition domain" /note="CRD"
CDS 1..246 /gene="MBL" /coded_by="AF227739.1:<1..742" /note="collectin with structural homology to mannose-binding lectin but with a predicted carbohydrate specificity for galactose"

ORIGIN 1 llllqfalql ldgaepqnln cpayggvpgt pghnglpgrd grdgkdgaig pkgekgesgv
61 svqgppgkag ppgtagekge rgpsgpqgsp gsesvleslk seiqqlkaki atfekvssvc
121 hfrkvgqkyy itdgvvgnfd qglkscmefg gtmvsprtsa enqallklvv ssglgskkpy
181 igvtdrkteg qfvdtegkql tftnwgpgqp ddykglqdcg viedtglwdd ggcgdirpim
241 ceidik

SEQ ID NO: 59
AAF63469 mannose binding-like lectin precursor [Danio rerio]
gi|7542472|gb|AAF63469.1|AF227738_1[7542472]
sig_peptide 1..23
mat_peptide 24..251 /product="mannose binding-like lectin"
Region 24..36 /region_name="N-terminal segment"
Region 37..101 /region_name="collagen-like structure"
Region 71..74 /region_name="break in collagen structure"
Region 102..132 /region_name="neck region"
Region 133..251 /region_name="carbohydrate recognition domain" /note="CRD"
CDS 1..251 /gene="mbl" /coded_by="AF227738.1:68..823" /note="collectin with structural homology to mannose-binding lectin but with a predicted carbohydrate specificity for galactose"
ORIGIN 1 mallklflga llllqlvlql magaadpqsl ncpayagvpg tpghnglpgr dgrvgrdgan
61 gpkgekgepg vnvqgppgka gppgpagakg ergpsglpgq dcmsdslkse lqklsdkial
121 iekvvnfktf kkvgqkyyvt ddveetfdkg mqycssngga lvlprtleen allkvfvssa
181 fkrlfiritd rekegefvdt drkkltftnw gpnqpdnykg aqdcgaiads glwddvscds
241 lypiiceiei k

SEQ ID NO: 60
AAF63468 mannose binding-like lectin precursor [Cyprinus carpio]
gi|7542470|gb|AAF63468.1|AF227737_1[7542470]

sig_peptide 1..23
mat_peptide 24..256 /product="mannose binding-like lectin"
Region 24..35 /region_name="N-terminal segment"
Region 36..103 /region_name="collagen-like structure"
Region 70..73 /region_name="break in collagen structure"
Region 104..134 /region_name="neck region"
Region 135..256 /region_name="carbohydrate recognition domain" /note="CRD"
CDS 1..256 /gene="MBL" /coded_by="AF227737.1:67..837" /note="collectin with structural homology to mannose-binding lectin but with a predicted carbohydrate specificity for galactose"
ORIGIN 1 malfklflgt llllqfalql ldgaepqnln cpayggvpgt pghnglpgrd grdgkdgaig
61 pkgekgesgv svqgppgkag ppgpagekge rgptgsqgsp gsesvleslk seiqqlkaki
121 atfekvasvg hfrqvgqkyy itdgvvgtfd qglkfckdfg gtmvfprtsa enqallklvv
181 ssglsskkpy igvtdreteg rfvntegkql tftnwgpgqp ddykglqdcg viedsglwdd
241 gscgdirpim ceidnk

SEQ ID NO: 61
AAK97540 surfactant protein A precursor [Gallus gallus]
gi|15420996|gb|AAK97540.1|AF411083_1[15420996]
sig_peptide 1..18
Region 19..34 /region_name="N-terminal segment"
Region 35..43 /region_name="putative collagen structure"
Region 44..76 /region_name="putative coil structure"
Region 77..97 /region_name="alpha-helical coil-coil structure; neck region"
Region 98..222 /region_name="carbohydrate recognition domain"
Site 121..123 /site_type="glycosylation"
Site 181..183 /site_type="glycosylation" /note="conserved"
CDS 1..222 /gene="SP-A" /coded_by="AF411083.1:61..729"
ORIGIN 1 mlsysfcmia aavalltpch aqncagapel psipgvsgll glgalkryfg sllwpygeek
61 lpecqwlqrq qdlstssdde lgnvllnlrq rilqlegvla ldgkitkvge kifasngkev
121 nfssalesce etggtlatpm neeenkaimg ivkqynryay lgikesdtag qfkyvnnqpl
181 nytswqqyep ngkgtekcve mytdgnwkdr kcnlyrltvc ey

SEQ ID NO: 62
JN0450 conglutinin precursor – bovine gi|346501|pir||JN0450[346501]

FEATURES Location/Qualifiers source 1..371 /organism="Bos taurus"
/db_xref="taxon:9913"
Protein 1..371 /product="conglutinin precursor" /note="C3b-binding protein"
Region 1..20 /region_name="domain" /note="signal sequence"
Region 21..371 /region_name="product" /note="conglutinin"
Region 46..214 /region_name="region" /note="collagen-like"
Site 63 /site_type="binding" /note="carbohydrate (Lys) (covalent)"
Site 63 /site_type="modified" /note="5-hydroxylysine (Lys)"
Region 75..371 /region_name="product" /note="conglutinin-N"
Site 78 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 87 /site_type="binding" /note="carbohydrate (Lys) (covalent)"
Site 87 /site_type="modified" /note="5-hydroxylysine (Lys)"

Site 96 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 99 /site_type="binding" /note="carbohydrate (Lys) (covalent)"
Site 99 /site_type="modified" /note="5-hydroxylysine (Lys)"
Site 108 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 111 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 129 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 132 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 135 /site_type="binding" /note="carbohydrate (Lys) (covalent)"
Site 135 /site_type="modified" /note="5-hydroxylysine (Lys)"
Site 141 /site_type="binding" /note="carbohydrate (Lys) (covalent)"
Site 141 /site_type="modified" /note="5-hydroxylysine (Lys)"
Site 147 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 153 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 159 /site_type="binding" /note="carbohydrate (Lys) (covalent)"
Site 159 /site_type="modified" /note="5-hydroxylysine (Lys)"
Site 162 /site_type="binding" /note="carbohydrate (Lys) (covalent)"
Site 162 /site_type="modified" /note="5-hydroxylysine (Lys)"
Site 171 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 195 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 198 /site_type="binding" /note="carbohydrate (Lys) (covalent)"
Site 198 /site_type="modified" /note="5-hydroxylysine (Lys)"
Site 210 /site_type="binding" /note="carbohydrate (Lys) (covalent)"
Site 210 /site_type="modified" /note="5-hydroxylysine (Lys)"
Region 248..369 /region_name="domain" /note="C-type lectin homology #label LCH"
Site 337 /site_type="binding" /note="carbohydrate (Asn) (covalent)"

ORIGIN 1 mlllplsvll lltqpwrslg aemttfsqki lanactlvmc splesglpgh dgqdgrecph
61 gekgdpgspg pagragrpgw vgpigpkgdn gfvgepgpkg dtgprgppgm pgpagregps
121 gkqgsmgppg tpgpkgetgp kggvgapgiq gfpgpsglkg ekgapgetga pgragvtgps
181 gaigpqgpsg argppglkgd rgdpgetgak gesglaevna lkqrvtildg hlrrfqnafs
241 qykkavlfpd gqavgekifk tagavksysd aeqlcreakg qlasprssae neavtqmvra
301 qeknaylsmn distegrfty ptgeilvysn wadgepnnsd egqpencvei fpdgkwndvp
361 cskqllvice f

SEQ ID NO: 63
A57250 mannan-binding protein - chicken (fragment)
gi|1362725|pir||A57250[1362725]

FEATURES Location/Qualifiers source 1..30 /organism="Gallus gallus" /db_xref="taxon:9031"
Protein 1..30 /product="mannan-binding protein" /note="collectin"
Site 28 /site_type="modified" /note="4-hydroxyproline (Pro)"
ORIGIN 1 lltcdkpeek myscpiiqcs apavnglpgd

SEQ ID NO: 64
A53570 collectin-43 – bovine gi|1083017|pir||A53570[1083017]

FEATURES Location/Qualifiers source 1..301 /organism="Bos taurus" /db_xref="taxon:9913"
Protein 1..301 /product="collectin-43" /note="lectin CL-43"
Region 177..299 /region_name="domain" /note="C-type lectin homology #label LCH"

ORIGIN 1 eemdvysekt ltdpctlvvc appadslrgh dgrdgkegpq gekgdpgppg mpgpagregp
61 sgrqgsmgpp gtpgpkgepg peggvgapgm pgspgpaglk gergapgpgg
aigpqgpsga
121 mgppglkgdr gdpgekgarg etsvlevdtl rqrmrnlege vqrlqnivtq yrkavlfpdg
181 qavgekifkt agavksysda eqlcreakgq lasprssaen eavtqlvrak nkhaylsmnd
241 iskegkftyp tggsldysnw apgepnnrak degpenclei ysdgnwndie creerlvice
301 f

SEQ ID NO: 65
AAF28384 lung surfactant protein A [Sus scrofa]
gi|6782434|gb|AAF28384.1|AF133668_1[6782434]

FEATURES Location/Qualifiers source 1..116 /organism="Sus scrofa"
/db_xref="taxon:9823"
Protein <1..116 /product="lung surfactant protein A" /function="involved in the innate immune system and lipid homeostasis within the lung" /name="collectin; SPA; SP-A"
CDS 1..116 /gene="SFTPA" /coded_by="AF133668.1:<1..353"
ORIGIN 1 avgekvfstn gqsvafdvir elcaraggri aaprspeene aiasivkkhn tyaylglveg
61 ptagdffyld gtpvnytnwy pgeprgrgke kcvemytdgq wndrncqqyr laicef

SEQ ID NO: 66
AAF22145 lung surfactant protein D precursor; SPD; SP-D; CP4 [Sus scrofa]
gi|6760482|gb|AAF22145.2|AF132496_1[6760482]

sig_peptide 1..20
mat_peptide 21..378 /product="lung surfactant protein D"
CDS 1..378 /gene="SFTPD" /coded_by="AF132496.2:44..1180"
ORIGIN 1 mllplsvli lltqpprslg aemktysqra vanacalvmc spmenglpgr dgrdgregpr
61 gekgdpglpg avgragmpgl agpvgpkgdn gstgepgakg digpcgppgp
pgipgpagke
121 gpsgqqgnig ppgtpgpkge tgpkgevgal gmqgstgarg paglkgerga pgergap-
gsa
181 gaagpagatg pqgpsgargp pglkgdrgpp gergakgesg lpgitalrqq vetlqgqvqr
241 lqkafsqykk velfpngrgv gekifktggf ektfqdaqqv ctqaggqmas prseteneal
301 sqlvtaqnka aflsmtdikt egnftyptge plvyanwapg epnnnggssg aencveifpn
361 gkwndkacge lrlvicef

SEQ ID NO: 67
P41317 MANNOSE-BINDING PROTEIN C PRECURSOR (MBP-C) (MANNAN-BINDING PROTEIN) (RA-REACTIVE FACTOR P28A SUBUNIT) (RARF/P28A)
gi|1346477|sp|P41317|MABC_MOUSE[1346477]

FEATURES Location/Qualifiers source 1..244 /organism="Mus musculus"
/db_xref="taxon:10090"
gene 1..244 /gene="MBL2"
Protein 1..244 /gene="MBL2" /product="MANNOSE-BINDING PROTEIN C PRECURSOR"
Region 1..18 /gene="MBL2" /region_name="Signal" /note="BY SIMILARITY."
Region 3 /gene="MBL2" /region_name="Conflict" /note="I -> L (IN REF. 1)."
Region 15 /gene="MBL2" /region_name="Conflict" /note="V -> A (IN REF. 1)."
Region 19..244 /gene="MBL2" /region_name="Mature chain" /note="MANNOSE-BINDING PROTEIN C."

Bond bond(29) /gene="MBL2" /bond_type="disulfide" /note="INTERCHAIN (BY SIMILARITY)."
Bond bond(34) /gene="MBL2" /bond_type="disulfide" /note="INTERCHAIN (BY SIMILARITY)."
Region 38..96 /gene="MBL2" /region_name="Domain" /note="COLLAGEN-LIKE (G-X-Y)."
Site 43 /gene="MBL2" /site_type="hydroxylation" /note="(POTENTIAL)."
Site 58 /gene="MBL2" /site_type="hydroxylation" /note="(POTENTIAL)."
Site 69 /gene="MBL2" /site_type="hydroxylation" /note="(POTENTIAL)."
Site 78 /gene="MBL2" /site_type="hydroxylation" /note="(POTENTIAL)."
Site 81 /gene="MBL2" /site_type="hydroxylation" /note="(POTENTIAL)."
Region 149..242 /gene="MBL2" /region_name="Domain" /note="C-TYPE LECTIN (SHORT FORM)."
Bond bond(151,240) /gene="MBL2" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(218,232) /gene="MBL2" /bond_type="disulfide" /note="BY SIMILARITY."

ORIGIN 1 msiftsflll cvvtvvyaet ltegvqnscp vvtcsspgln gfpgkdgrdg akgekgepgq
61 glrglqgppg kvgptgppgn pglkgavgpk gdrgdraefd tseidseiaa lrselralrn
121 wvlfslsekv gkkyfvssvk kmsldrvkal csefqgsvat prnaeensai qkvakdiayl
181 gitdvrvegs fedltgnrvr ytnwndgepn ntgdgedcvv ilgngkwndv pcsdsflaic
241 efsd

SEQ ID NO: 68
P39039 MANNOSE-BINDING PROTEIN A PRECURSOR (MBP-A) (MANNAN-BINDING PROTEIN) (RA-REACTIVE FACTOR POLYSACCHARIDE-BINDING COMPONENT P28B POLYPEPTIDE) (RARF P28B)
gi|729972|sp|P39039|MABA_MOUSE[729972]

FEATURES Location/Qualifiers source 1..239 /organism="Mus musculus" /db_xref="taxon:10090"
gene 1..239 /gene="MBL1"
Protein 1..239 /gene="MBL1" /product="MANNOSE-BINDING PROTEIN A PRECURSOR"
Region 1..17 /gene="MBL1" /region_name="Signal" /note="BY SIMILARITY."
Region 18..239 /gene="MBL1" /region_name="Mature chain" /note="MANNOSE-BINDING PROTEIN A." Region 37..89 /gene="MBL1" /region_name="Domain" /note="COLLAGEN-LIKE (G-X-Y)."
Region 144..239 /gene="MBL1" /region_name="Domain" /note="C-TYPE LECTIN (SHORT FORM)."
Bond bond(146,235) /gene="MBL1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(213,227) /gene="MBL1" /bond_type="disulfide" /note="BY SIMILARITY."

ORIGIN 1 mlllpllpvl lcvvsvsssg sqtcedtlkt csviacgrdg rdgpkgekge pgqglrglqg
61 ppgklgppgs vgspgspgpk gqkgdhgdnr aieeklanme aeirilkskl qltnklhafs
121 mgkksgkklf vtnhekmpfs kvkslctelq gtvaiprnae enkaiqevat giaflgitde
181 ategqfmyvt ggrltysnwk kdepnnhgsg edcviildng lwndiscqas fkavcefpa

SEQ ID NO: 69
P42916 COLLECTIN-43 (CL-43) gi|1168967|sp|P42916|CL43_BOVIN[1168967]
FEATURES Location/Qualifiers source 1..301 /organism="Bos taurus" /db_xref="taxon:9913"
Protein 1..301 /product="COLLECTIN-43"

Region 29..142 /region_name="Domain" /note="COLLAGEN-LIKE (G-X-Y)."
Region 202..301 /region_name="Domain" /note="C-TYPE LECTIN (SHORT FORM)."
Bond bond(204,299) /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(277,291) /bond_type="disulfide" /note="BY SIMILARITY."
ORIGIN 1 eemdvysekt ltdpctlvvc appadslrgh dgrdgkegpq gekgdpgppg mpgpagregp
61 sgrqgsmgpp gtpgpkgepg peggvgapgm pgspgpaglk gergapgpgg aigpqgpsga
121 mgppglkgdr gdpgekgarg etsvlevdtl rqrmrnlege vqrlqnivtq yrkavlfpdg
181 qavgekifkt agavksysda eqlcreakgq lasprssaen eavtqlvrak nkhaylsmnd
241 iskegkftyp tggsldysnw apgepgnrak degpenclei ysdgnwndie creerlvice
301 f

SEQ ID NO: 70
CAB56155 DMBT1/8kb.2 protein [Homo sapiens]
gi|5912464|emb|CAB56155.1|[5912464]
sig_peptide 1..26
mat_peptide 26..2412 /product="DMBT1/8kb.2 protein"
CDS 1..2412 /gene="DMBT1" /coded_by="AJ243212.1:107..7345"
/note="Sequence is an alternative splice form of the DMBT1 gene that is expressed in human adult trachea. Isoforms of DMBT1 are identical to the collectin binding protein gp-340. Full-length cDNA clone contains 1 bp deletions in codons 100 and 1751, that were corrected by comparison with the genomic exons"
ORIGIN 1 mgistvilem cllwgqvlst ggwiprttdy aslipsevpl dttvaegspf pseltlestv
61 aegspisles tlettvaegs lipsestles tvaegsdsgl alrlvngdgr cqgrveilyr
121 gswgavcdds wdtndanvvc rqlgcgwams apgnawfgqg sgpialddvr csghesylws
181 cphngwlshn cghgedagvi csaaqpqstl rpeswpvris ppvptegses slalrlvngg
241 drcrgrvevl yrgswgtvcd dywdtndanv vcrqlgcgwa msapgnaqfg qgsgpivldd
301 vrcsghesyl wscphngwlt hncghsedag vicsapqsrp tpspdtwpts hastagpess
361 lalrlvnggd rcqgrvevly rgswgtvcdd swdtsdanvv crqlgcgwat sapgnarfgq
421 gsgpivlddv rcsgyesylw scphngwlsh ncqhsedagv icsaahswst pspdtlptit
481 lpastvgses slalrlvngg drcqgrvevl yrgswgtvcd dswdtndanv vcrqlgcgwa
541 mlapgnarfg qgsgpivldd vrcsgnesyl wscphngwls hncghsedag vicsgpessl
601 alrlvnggdr cqgrvevlyr gswgtvcdds wdtndanvvc rqlgcgwams apgnarfgqg
661 sgpivlddvr csghesylws cpnngwlshn cghhedagvi csaaqsrstp rpdtlstitl
721 ppstvgsess ltlrlvngsd rcqgrvevly rgswgtvcdd swdtndanvv crqlgcgwat
781 sapgnarfgq gsgpivlddv rcsghesylw scphngwlsh ncghhedagv icsvsqsrpt
841 pspdtwptsh astagpessl alrlvnggdr cqgrvevlyr gswgtvcdds wdtsdanvvc
901 rqlgcgwats apgnarfgqg sgpivlddvr csgyesylws cphngwlshn cqhsedagvi
961 csaahswstp spdtlptitl pastvgsess lalrlvnggd rcqgrvevly qgswgtvcdd
1021 swdtndanvv crqlgcgwam sapgnarfgq gsgpivldda rcsghesylw scphngwlsh
1081 ncghsedagv icsasqsrpt pspdtwptsh astagsessl alrlvnggdr cqgrvevlyr
1141 gswgtvcddy wdtndanvac rqlgcgwams apgnarfgqg sgpivlddvr csghesylws
1201 cphngwlshn cghhedagvi csasqsqptp spdtwptsha stagsessla lrlvnggdrc
1261 qgrvevlyrg swgtvcddyw dtndanvvcr qlgcgwatsa pgnarfgqgs gpivlddvrc
1321 sghesylwsc phngwlshnc ghhedagvic sasqsqptps pdtwptshas tagsesslal
1381 rlvnggdrcq grvevlyrgs wgtvcddywd tndanvvcrq lgcgwatsap gnarfgqgsg
1441 pivlddvrcs ghesylwscp hngwlshncg hhedagvics afqsqptpsp dtwptsrast
1501 agsestlalr lvnggdrcrg rvevlyqgsw gtvcddywdt ndanvvcrql gcgwamsapg
1561 naqfgqgsgp ivlddvrcsg hepylwscph ngwlshncgh hedagvicsa aqsqstprpd
1621 twlttnlpal tvgsesslal rlvnggdrcr grvevlyrgs wgtvcddswd tndanvvcrq
1681 lgcgwamsap gnarfgqgsg pivlgdvrcs gnesylwscp hkgwlthncg hhedagvics

1741 atqinsttd wwhpttttta rpssncggfl fyasgtfssp sypayypnna kcvweievns
1801 gyrinlgfsn lkleahhncs fdyveifdgs lnsslllgki cndtrqifts synrmtihfr
1861 sdisfqntgf lawynsfpsd atlrlvnlns syglcagrve iyhggtwgav cddswtiqea
1921 evvcrqlgcg ravsalgnay fgsgsgpitl ddvecsgtes tlwqcrnrgw fshncnhred
1981 agvicsgnhl stpapflnit rpnnyscggf lsqpsgdfss pfypgnypnn akcvwdievq
2041 nnyrvtvifr dvqleggcny dyievfdgpy rsspliarvc dgargsftss snfmsirfis
2101 dhsitrrgfr aeyyssspsnd stnllclpnh mqasvsrsyl qslgfsasdl vistwngyye
2161 crpqitpnlv iftipysgcg tfkqadndti dysnlltaav sggiikrrtd lrihvscrml
2221 qntwvdtmyi andtihvann tiqveevqyg nfdvnisfyt sssflypvts rpyyvdlnqd
2281 lyvqaeilhs davltlfvdt cvaspysndf tsltydlirs gcvrddtygp ysspslriar
2341 frfrafhfln rfpsvylrck mvvcraydps srcyrgcvlr skrdvgsyqe kvdvvlgpiq
2401 lqtpprreee pr

SEQ ID NO: 71
BAA81747 collectin 34 [Homo sapiens] gi|5162875|dbj|BAA81747.1|[5162875]
FEATURES Location/Qualifiers source 1..277 /organism="Homo sapiens"
/db_xref="taxon:9606"
Protein 1..277 /product="collectin 34"
CDS 1..277 /coded_by="AB002631.1:6..839"
ORIGIN 1 mngfasllrr nqfillvlfl lqiqslgldi dsrptaevca thtispgpkg ddgekgdpge
61 egkhgkvgrm gpkgikgelg dmgdrgnigk tgpigkkgdk gekgllgipg ekgkagtvcd
121 cgryrkfvgq ldisiarlkt smkfvknvia gireteekfy yivqeeknyr eslthcrirg
181 gmlampkdea antliadyva ksgffrvfig vndleregqy mftdntplqn ysnwnegeps
241 dpyghedcve mlssgrwndt echltmyfvc efikkkk

SEQ ID NO: 72
AAB94071 mannan-binding lectin; collectin [Gallus gallus]
gi|2736145|gb|AAB94071.1|[2736145]
FEATURES Location/Qualifiers source 1..238 /organism="Gallus gallus"
/strain="White Leghorn" /db_xref="taxon:9031" /tissue_type="liver"
Protein 1..>238 /product="mannan-binding lectin" /name="c-type lectin"
/note="mannan-binding protein; MBP; mannose-binding protein; MBL; collectin"
CDS 1..238 /gene="cMBl" /coded_by="AF022226.1:1..>714"
ORIGIN 1 mmatsllttd kpeekmyscp iiqcsapavn glpgrdgrdg pkgekgdpge glrglqglpg
61 kagpqglkge vgpqgekgqk gergivvtdd lhrqitdlea kirvleddls rykkalslkd
121 vvnigkkmfv stgkkynfek gkslcakags vlasprneae ntalkdlidp ssqayigisd
181 aqtegrfmyl sggpltysnw kpgepnnhkn edcaviedsg kwndldcsns nifiicel

SEQ ID NO: 73
AAB36019 mannan-binding protein, MBP=lectin {N-terminal} [chickens, serum,
Peptide Partial, 30 aa] [Gallus gallus] gi|1311692|gb|AAB36019.1|[1311692]
FEATURES Location/Qualifiers source 1..30 /organism="Gallus gallus"
/db_xref="taxon:9031"
Protein 1..30 /partial /product="mannan-binding protein" /name="lectin" /note="MBP"
ORIGIN 1 lltcdkpeek myscpiiqcs apavnglpgd

SEQ ID NO: 74
AAB27504 conglutinin (N) {N-terminal} [cattle, Peptide Partial, 60 aa] [Bos taurus]
gi|386660|gb|AAB27504.1|[386660]
FEATURES Location/Qualifiers source 1..60 /organism="Bos taurus"
/db_xref="taxon:9913"
Protein 1..60 /partial /product="conglutinin (N)"
ORIGIN 1 aemttfsqki lanactlvmc splesglpgh dgqdgrecph gekgdpgspg pagragrpgw

SEQ ID NO: 75
CAA53511 collectin-43 [Bos taurus] gi|499385|emb|CAA53511.1|[499385]
FEATURES Location/Qualifiers source 1..301 /organism="Bos taurus"
/db_xref="taxon:9913" /tissue_type="liver" /clone_lib="lambda gt 11"
Protein 1..301 /product="collectin-43"
mat_peptide 1..301 /product="collectin-43"
CDS 1..301 /coded_by="X75912.1:<1..906" /db_xref="SWISS-PROT:P42916"
ORIGIN 1 eemdvyxekt ltdpctlvvc appadslrgh dgrdgkegpq gekgdpgppg mpgpagregp
61 sgrqgsmgpp gtpgpkgepg peggvgapgm pgspgpaglk gergapgpgg
aigpqqgpsga
121 mgppglkgdr gdpgekgarg etsvlevdtl rqrmrnlege vqrlqnivtq yrkavlfpdg
181 qavgekifkt agavksysda eqlcreakgq lasprssaen eavtqlvrak nkhaylsmnd
241 iskegkftyp tggsldysnw apgepgnrak degpenclei ysdgnwndie creerlvice
301 f

SEQ ID NO: 76
AAA82010 mannose-binding protein C [Mus musculus]
gi|773288|gb|AAA82010.1|[773288]
FEATURES Location/Qualifiers source 1..244 /organism="Mus musculus"
/strain="BALB/c" /db_xref="taxon:10090" /clone="Lambda 14 and 52; Cos11A"
/clone_lib="NIH/3T3 Swiss mouse embryo cell line and BALB/c pWE15 cosmid li-
brary"
Protein 1..244 /product="mannose-binding protein C"
Site 1..59 /site_type="signal-peptide" /note="signal-peptide and collagen-like region"
mat_peptide <59..>98 /product="mannose-binding protein C" /note="collagen-like
domain"
mat_peptide <98..>121 /product="mannose-binding protein C" /note="linking-peptide
domain"
mat_peptide <121..244 /product="carbohydrate recognition domain"
CDS 1..244 /gene="Mbl2" /coded_by="join(U09013.1:470..644,U09014.1:43..159,
U09015.1:97..165,U09016.1:576..949)"
ORIGIN 1 msiftsflll cvvtvvyaet ltegvqnscp vvtcsspgln gfpgkdgrdg akgekgepgq
61 glrglqgppg kvgptgppgn pglkgavgpk gdrgdraefd tseidseiaa lrslralrn
121 wvlfslsekv gkkyfvssvk kmsldrvkal csefqgsvat prnaeensai qkvakdiayl
181 gitdvrvegs fedltgnrvr ytnwndgepn ntgdgedcvv ilgngkwndv pcsdsflaic
241 efsd

SEQ ID NO: 77
AAA82009 mannose-binding protein A [Mus musculus]
gi|773280|gb|AAA82009.1|[773280]

sig_peptide 1..18
mat_peptide 19..239 /product="unnamed"
mat_peptide 19..>52 /product="mannose-binding protein A" /note="collagen-like
region"
mat_peptide <52..>91 /product="mannose-binding protein A" /note="collagen-like
domain"
mat_peptide <91..>116 /product="mannose-binding protein A" /note="linking-peptide
domain"
CDS 1..239 /gene="Mbl1" /coded_by="join(U09007.1:275..428,U09008.1:287..403,
U09009.1:166..240,U09010.1:78..451)"
ORIGIN 1 mlllpllpvl lcvvsvsssg sqtcedtlkt csviacgrdg rdgpkgekge pgqglrglqg

61 ppgklgppgs vgspgspgpk gqkgdhgdnr aieeklanme aeirilkskl qltnklhafs
121 mgkksgkklf vtnhekmpfs kvkslctelq gtvaiprnae enkaiqevat giaflgitde
181 ategqfmyvt ggrltysnwk kdepnnhgsg edcviildng lwndiscqas fkavcefpa

Lung surfactant protein

SEQ ID NO: 78
P35247 Pulmonary surfactant-associated protein D precursor (SP-D) (PSP-D)
gi|464486|sp|P35247|PSPD_HUMAN[464486]

FEATURES Location/Qualifiers source 1..375 /organism="Homo sapiens"
/db_xref="taxon:9606"
gene 1..375 /gene="SFTPD" /note="SFTP4; PSPD"
Protein 1..375 /gene="SFTPD" /product="Pulmonary surfactant-associated protein D precursor"
Region 1..20 /gene="SFTPD" /region_name="Signal" /note="BY SIMILARITY."
Region 21..375 /gene="SFTPD" /region_name="Mature chain"
/note="PULMONARY SURFACTANT-ASSOCIATED PROTEIN D."
Region 31 /gene="SFTPD" /region_name="Conflict" /note="M -> T (IN REF. 2)."
Region 46..222 /gene="SFTPD" /region_name="Domain" /note="COLLAGEN-LIKE."
Region 59 /gene="SFTPD" /region_name="Conflict" /note="P -> F (IN REF. 3)."
Site 78 /gene="SFTPD" /site_type="hydroxylation" /note="(BY SIMILARITY)."
Site 87 /gene="SFTPD" /site_type="hydroxylation" /note="(BY SIMILARITY)."
Site 90 /gene="SFTPD" /site_type="glycosylation" /note="N-LINKED (GLCNAC...) (POTENTIAL)."
Site 96 /gene="SFTPD" /site_type="hydroxylation" /note="(BY SIMILARITY)."
Site 99 /gene="SFTPD" /site_type="hydroxylation" /note="(BY SIMILARITY)."
Region 122 /gene="SFTPD" /region_name="Conflict" /note="A -> P (IN REF. 2)."
Site 171 /gene="SFTPD" /site_type="hydroxylation" /note="(BY SIMILARITY)."
Site 177 /gene="SFTPD" /site_type="hydroxylation" /note="(BY SIMILARITY)."
Region 180 /gene="SFTPD" /region_name="Conflict" /note="T -> A (IN REF. 2)."
Region 206 /gene="SFTPD" /region_name="Conflict" /note="D -> P (IN REF. 3)."
Region 223..252 /gene="SFTPD" /region_name="Domain" /note="COILED COIL (POTENTIAL)."
Region 227..253 /gene="SFTPD" /region_name="Helical region"
Region 254..256 /gene="SFTPD" /region_name="Hydrogen bonded turn"
Region 257..260 /gene="SFTPD" /region_name="Beta-strand region"
Region 261..262 /gene="SFTPD" /region_name="Hydrogen bonded turn"
Region 263..272 /gene="SFTPD" /region_name="Beta-strand region"
Region 274..283 /gene="SFTPD" /region_name="Helical region"
Region 279..375 /gene="SFTPD" /region_name="Domain" /note="C-TYPE LECTIN (SHORT FORM)."
Bond bond(281,373) /gene="SFTPD" /bond_type="disulfide"
Region 284..285 /gene="SFTPD" /region_name="Hydrogen bonded turn"
Region 287..288 /gene="SFTPD" /region_name="Beta-strand region"
Region 294..307 /gene="SFTPD" /region_name="Helical region"
Region 308 /gene="SFTPD" /region_name="Hydrogen bonded turn"
Region 311..316 /gene="SFTPD" /region_name="Beta-strand region"
Region 321..322 /gene="SFTPD" /region_name="Hydrogen bonded turn"
Region 325 /gene="SFTPD" /region_name="Beta-strand region"
Region 327..328 /gene="SFTPD" /region_name="Hydrogen bonded turn"

Region 331 /gene="SFTPD" /region_name="Beta-strand region"
Region 337 /gene="SFTPD" /region_name="Beta-strand region"
Region 339..340 /gene="SFTPD" /region_name="Hydrogen bonded turn"
Region 345..347 /gene="SFTPD" /region_name="Helical region"
Bond bond(351,365) /gene="SFTPD" /bond_type="disulfide"
Region 351..354 /gene="SFTPD" /region_name="Beta-strand region"
Region 356..357 /gene="SFTPD" /region_name="Hydrogen bonded turn"
Region 360..363 /gene="SFTPD" /region_name="Beta-strand region"
Region 365..366 /gene="SFTPD" /region_name="Hydrogen bonded turn"
Region 369..375 /gene="SFTPD" /region_name="Beta-strand region"
Region 374 /gene="SFTPD" /region_name="Conflict" /note="E -> EH (IN REF. 3)."
ORIGIN 1 mllfllsalv lltqplgyle aemktyshrt mpsactlvmc ssvesglpgr dgrdgregpr
61 gekgdpglpg aagqagmpgq agpvgpkgdn gsvgepgpkg dtgpsgppgp
pgvpgpagre
121 galgkqgnig pqgkpgpkge agpkgevgap gmqgsagarg lagpkgergv
pgergvpgnt
181 gaagsagamg pqgspgargp pglkgdkgip gdkgakgesg lpdvaslrqq vealqgqvqh
241 lqaafsqykk velfpngqsv gekifktagf vkpfteaqll ctqaggqlas prsaaenaal
301 qqlvvaknea aflsmtdskt egkftyptge slvysnwapg epnddggsed cveiftngkw
361 ndracgekrl vvcef

SEQ ID NO: 79
NP_002395 microfibrillar-associated protein 4; microfibril-associated glycoprotein 4 [Homo sapiens] gi|23111005|ref|NP_002395.1|[23111005]

FEATURES Location/Qualifiers source 1..255 /organism="Homo sapiens" /db_xref="taxon:9606" /chromosome="17" /map="17p11.2"
Protein 1..255 /product="microfibrillar-associated protein 4" /note="microfibril-associated glycoprotein 4"
Region 36..255 /region_name="smart00186, FBG, Fibrinogen-related domains (FReDs); Domain present at the C-termini of fibrinogen beta and gamma chains, and a variety of fibrinogen-related proteins, including tenascin and Drosophila scabrous"
Region 38..254 /region_name="pfam00147, fibrinogen_C, Fibrinogen beta and gamma chains, C-terminal globular domain"
CDS 1..255 /gene="MFAP4" /coded_by="NM_002404.1:26..793" /db_xref="LocusID:4239" /db_xref="MIM:600596"
ORIGIN 1 mkallalpll lllstppcap qvsgirgdal erfclqqpld cddiyaqgyq sdgvyliyps
61 gpsvpvpvfc dmtteggkwt vfqkrfngsv sffrgwndyk lgfgradgey wlglqnmhll
121 tlkqkyelrv dledfennta yakyadfsis pnavsaeedg ytlfvagfed ggagdslsyh
181 sgqkfstfdr dqdlfvqnca alssgafwfr schfanlngf ylggshlsya nginwaqwkg
241 fyyslkrtem kirra

SEQ ID NO: 80
1KMRA Chain A, Solution Nmr Structure Of Surfactant Protein B (11-25) (Sp- B11-25) gi|22219056|pdb|1KMR|A[22219056]

FEATURES Location/Qualifiers source 1..15 /organism="Homo sapiens" /db_xref="taxon:9606"
SecStr 3..11 /sec_str_type="helix" /note="helix 1"
ORIGIN 1 cralikriqa mipkg

SEQ ID NO: 81

P50404 Pulmonary surfactant-associated protein D precursor (SP-D) (PSP-D) gi|1709879|sp|P50404|PSPD_MOUSE[1709879]
FEATURES Location/Qualifiers source 1..374 /organism="Mus musculus" /db_xref="taxon:10090"
gene 1..374 /gene="SFTPD" /note="SFTP4"
Protein 1..374 /gene="SFTPD" /product="Pulmonary surfactant-associated protein D precursor"
Region 1..19 /gene="SFTPD" /region_name="Signal" /note="BY SIMILARITY."
Region 20..374 /gene="SFTPD" /region_name="Mature chain" /note="PULMONARY SURFACTANT-ASSOCIATED PROTEIN D."
Region 45..221 /gene="SFTPD" /region_name="Domain" /note="COLLAGEN-LIKE."
Site 89 /gene="SFTPD" /site_type="glycosylation" /note="N-LINKED (GLCNAC...) (POTENTIAL)."
Region 222..253 /gene="SFTPD" /region_name="Domain" /note="COILED COIL (POTENTIAL)."
Region 278..374 /gene="SFTPD" /region_name="Domain" /note="C-TYPE LECTIN (SHORT FORM)."
Bond bond(280,372) /gene="SFTPD" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(350,364) /gene="SFTPD" /bond_type="disulfide" /note="BY SIMILARITY."
ORIGIN 1 mlpflsmlvl lvqplgnlga emkslsqrsv pntctlvmcs ptenglpgrd grdgregprg
61 ekgdpglpgp mglsglqgpt gpvgpkgeng sagepgpkge rglsgppglp gipgpagkeg
121 psgkqgnigp qgkpgpkgea gpkgevgapg mqgstgakgs tgpkgergap gvqgapgnag
181 aagpagpagp qgapgsrgpp glkgdrgvpg drgikgesgl pdsaalrqqm ealkgklqrl
241 evafshyqka alfpdgrsvg dkifrtadse kpfedaqemc kqaggqlasp rsatenaaiq
301 qlitahnkaa flsmtdvgte gkftyptgep lvysnwapge pnnnggaenc veiftngqwn
361 dkacgeqrlv icef

SEQ ID NO: 82
P06908 Pulmonary surfactant-associated protein A precursor (SP-A) (PSP-A) (PSAP) gi|1172693|sp|P06908|PSPA_CANFA[1172693]

FEATURES Location/Qualifiers source 1..248 /organism="Canis familiaris" /db_xref="taxon:9615"
gene 1..248 /gene="SFTPA1" /note="SFTPA; SFTP1"
Protein 1..248 /gene="SFTPA1" /product="Pulmonary surfactant-associated protein A precursor"
Region 1..17 /gene="SFTPA1" /region_name="Signal"
Region 18..248 /gene="SFTPA1" /region_name="Mature chain" /note="PULMONARY SURFACTANT-ASSOCIATED PROTEIN A."
Site 20 /gene="SFTPA1" /site_type="glycosylation" /note="N-LINKED (GLCNAC...) (POTENTIAL)."
Region 28..100 /gene="SFTPA1" /region_name="Domain" /note="COLLAGEN-LIKE."
Region 153..248 /gene="SFTPA1" /region_name="Domain" /note="C-TYPE LECTIN (SHORT FORM)."
Bond bond(155,246) /gene="SFTPA1" /bond_type="disulfide" /note="BY SIMILARITY."
Site 207 /gene="SFTPA1" /site_type="glycosylation" /note="N-LINKED (GLCNAC...) (PROBABLE)."

Bond bond(224,238) /gene="SFTPA1" /bond_type="disulfide" /note="BY SIMILARITY."
ORIGIN 1 mwlrclalal tllmvsgien ntkdvcvgnp gipgtpgshg lpgrdgrdgv kgdpgppgpl
61 gppggmpghp gpngmtgapg vagergekge pgergppglp asldeelqtt lhdlrhqilq
121 tmgvlslhes llvvgrkvfs snaqsinfnd iqelcagagg qiaapmspee neavasivkk
181 yntyaylglv espdsgdfqy mdgapvnytn wypgeprgrg keqcvemytd gqwnnknclq
241 yrlaicef

SEQ ID NO: 83
P12842 Pulmonary surfactant-associated protein A precursor (SP-A) (PSP-A) (PSAP) gi|131413|sp|P12842|PSPA_RABIT[131413]

FEATURES Location/Qualifiers source 1..247 /organism="Oryctolagus cuniculus" /db_xref="taxon:9986"
gene 1..247 /gene="SFTPA1" /note="SFTPA; SFTP1"
Protein 1..247 /gene="SFTPA1" /product="Pulmonary surfactant-associated protein A precursor"
Region 1..15 /gene="SFTPA1" /region_name="Signal" /note="POTENTIAL."
Region 12 /gene="SFTPA1" /region_name="Variant" /note="S -> P."
Region 16..247 /gene="SFTPA1" /region_name="Mature chain" /note="PULMONARY SURFACTANT-ASSOCIATED PROTEIN A."
Region 27..99 /gene="SFTPA1" /region_name="Domain" /note="COLLAGEN-LIKE."
Region 57..60 /gene="SFTPA1" /region_name="Conflict" /note="GPMG -> APWA (IN REF. 2)."
Region 152..247 /gene="SFTPA1" /region_name="Domain" /note="C-TYPE LECTIN (SHORT FORM)."
Bond bond(154,245) /gene="SFTPA1" /bond_type="disulfide" /note="BY SIMILARITY."
Site 206 /gene="SFTPA1" /site_type="glycosylation" /note="N-LINKED (GLCNAC...) (PROBABLE)."
Bond bond(223,237) /gene="SFTPA1" /bond_type="disulfide" /note="BY SIMILARITY."
ORIGIN 1 mlllslaltl isapasdtcd tkdvcigspg ipgtpgshgl pgrdgrdgvk gdpgppgpmg
61 ppggmpglpg rdgligapgv pgergdkgep gergppglpa yldeelqatl helrhhalqs
121 igvlslqgsm kavgekifst ngqsvnfdai revcaraggr iavprsleen eaiasivker
181 ntyaylglae gptagdfyyl dgdpvnytnw ypgeprgqgr ekcvemytdg kwndknclqy
241 rlvicef

SEQ ID NO: 84
NP_033186 surfactant associated protein D [Mus musculus] gi|6677921|ref|NP_033186.1|[6677921]

sig_peptide 1..19
mat_peptide 20..374 /product="surfactant associated protein D"
Region 260..373 /region_name="C-type lectin (CTL) or carbohydrate-recognition domain (CRD)" /note="CLECT" /db_xref="CDD:smart00034"
Region 271..374 /region_name="Lectin C-type domain" /note="lectin_c" /db_xref="CDD:pfam00059"
CDS 1..374 /gene="Sftpd" /coded_by="NM_009160.1:43..1167" /db_xref="LocusID:20390" /db_xref="MGD:109515"
ORIGIN 1 mlpflsmlvl lvqplgnlga emkslsqrsv pntctlvmcs ptenglpgrd grdgregprg
61 ekgdpglpgp mglsglqgpt gpvgpkgeng sagepgpkge rglsgppglp gipgpagkeg

121 psgkqgnigp qgkpgpkgea gpkgevgapg mqgstgakgs tgpkgergap gvqgapgnag
181 aagpagpagp qgapgsrgpp glkgdrgvpg drgikgesgl pdsaalrqqm ealkgklqrl
241 evafshyqka alfpdgrsvg dkifrtadse kpfedaqemc kqaggqlasp rsatenaaiq
301 qlitahnkaa flsmtdvgte gkftyptgep lvysnwapge pnnnggaenc veiftngqwn
361 dkacgeqrlv icef

SEQ ID NO: 85
1B08C Chain C, Lung Surfactant Protein D (Sp-D) (Fragment)
gi|6573321|pdb|1B08|C[6573321]

FEATURES Location/Qualifiers source 1..158 /organism="Homo sapiens" /db_xref="taxon:9606"
SecStr 13..36 /sec_str_type="helix" /note="helix 7"
Region 38..158 /region_name="Domain 3" /note="NCBI Domains"
SecStr 39..44 /sec_str_type="sheet" /note="strand 21"
SecStr 45..51 /sec_str_type="sheet" /note="strand 22"
SecStr 53..56 /sec_str_type="sheet" /note="strand 23"
SecStr 57..67 /sec_str_type="helix" /note="helix 8"
Bond bond(64,156) /bond_type="disulfide"
SecStr 77..90 /sec_str_type="helix" /note="helix 9"
SecStr 93..96 /sec_str_type="sheet" /note="strand 24"
Het join(bond(100),bond(100),bond(100),bond(104),bond(104), bond(104),bond(127),bond(132),bond(133)) /heterogen="(CA, 8)"
Het join(bond(104),bond(133),bond(133),bond(133)) /heterogen="(CA, 9)"
SecStr 107..110 /sec_str_type="sheet" /note="strand 25"
SecStr 112..115 /sec_str_type="sheet" /note="strand 26"
Het join(bond(124),bond(126),bond(132),bond(144),bond(145), bond(145),bond(145),bond(145),bond(145),bond(145), bond(145),bond(145),bond(145),bond(145),bond(145), bond(145),bond(145),bond(145),bond(145),bond(145), bond(145),bond(145),bond(145),bond(145),bond(145), bond(145)) /heterogen="(CA, 7)"
SecStr 133..139 /sec_str_type="sheet" /note="strand 27"
Bond bond(134,148) /bond_type="disulfide"
SecStr 141..147 /sec_str_type="sheet" /note="strand 28"
SecStr 150..158 /sec_str_type="sheet" /note="strand 29"
ORIGIN 1 eaeagsvasl rqqvealqgq vqhlqaafsq ykkvelfpng qsvgekifkt agfvkpftea
61 qllctqaggq lasprsaaen aalqqlvvak neaaflsmtd sktegkftyp tgeslvysnw
121 apgepnddgg sedcveiftn gkwndracge krlvvcef

SEQ ID NO: 86
1B08B Chain B, Lung Surfactant Protein D (Sp-D) (Fragment)
gi|6573320|pdb|1B08|B[6573320]

FEATURES Location/Qualifiers source 1..158 /organism="Homo sapiens" /db_xref="taxon:9606"
SecStr 11..34 /sec_str_type="helix" /note="helix 4"
Region 37..158 /region_name="Domain 2" /note="NCBI Domains"
SecStr 39..44 /sec_str_type="sheet" /note="strand 11"
SecStr 45..51 /sec_str_type="sheet" /note="strand 12"
SecStr 53..56 /sec_str_type="sheet" /note="strand 13"
SecStr 57..67 /sec_str_type="helix" /note="helix 5"

Bond bond(64,156) /bond_type="disulfide"
SecStr 77..90 /sec_str_type="helix" /note="helix 6"
SecStr 93..96 /sec_str_type="sheet" /note="strand 14"
SecStr 97..100 /sec_str_type="sheet" /note="strand 15"
Het join(bond(100),bond(100),bond(100),bond(104),bond(104),
bond(104),bond(127),bond(132),bond(133)) /heterogen="(CA, 5)"
Het join(bond(104),bond(133),bond(133),bond(133)) /heterogen="(CA, 6)"
SecStr 107..110 /sec_str_type="sheet" /note="strand 16"
Het join(bond(124),bond(126),bond(132),bond(144),bond(145), bond(145))
/heterogen="(CA, 4)"
SecStr 133..139 /sec_str_type="sheet" /note="strand 17"
Bond bond(134,148) /bond_type="disulfide"
SecStr 141..147 /sec_str_type="sheet" /note="strand 18"
SecStr 150..153 /sec_str_type="sheet" /note="strand 19"
SecStr 154..158 /sec_str_type="sheet" /note="strand 20"
ORIGIN 1 eaeagsvasl rqqvealqgq vqhlqaafsq ykkvelfpng qsvgekifkt agfvkpftea
61 qllctqaggq lasprsaaen aalqqlvvak neaaflsmtd sktegkftyp tgeslvysnw
121 apgepnddgg sedcveiftn gkwndracge krlvvcef

SEQ ID NO: 87
1B08A Chain A, Lung Surfactant Protein D (Sp-D) (Fragment)
gi|6573319|pdb|1B08|A[6573319]

FEATURES Location/Qualifiers source 1..158 /organism="Homo sapiens"
/db_xref="taxon:9606"
SecStr 10..36 /sec_str_type="helix" /note="helix 1"
Region 38..158 /region_name="Domain 1" /note="NCBI Domains"
SecStr 39..44 /sec_str_type="sheet" /note="strand 1"
SecStr 45..51 /sec_str_type="sheet" /note="strand 2"
SecStr 53..56 /sec_str_type="sheet" /note="strand 3"
SecStr 57..67 /sec_str_type="helix" /note="helix 2"
Bond bond(64,156) /bond_type="disulfide"
SecStr 77..90 /sec_str_type="helix" /note="helix 3"
SecStr 93..96 /sec_str_type="sheet" /note="strand 4"
SecStr 97..100 /sec_str_type="sheet" /note="strand 5"
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bond(104),bond(127),bond(132),bond(133)) /heterogen="(CA, 2)"
Het join(bond(104),bond(133),bond(133),bond(133)) /heterogen="(CA, 3)"
SecStr 107..110 /sec_str_type="sheet" /note="strand 6"
Het join(bond(124),bond(126),bond(132),bond(144),bond(145), bond(145))
/heterogen="(CA, 1)"
SecStr 133..139 /sec_str_type="sheet" /note="strand 7"
Bond bond(134,148) /bond_type="disulfide"
SecStr 141..147 /sec_str_type="sheet" /note="strand 8"
SecStr 150..153 /sec_str_type="sheet" /note="strand 9"
SecStr 154..158 /sec_str_type="sheet" /note="strand 10"
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61 qllctqaggq lasprsaaen aalqqlvvak neaaflsmtd sktegkftyp tgeslvysnw
121 apgepnddgg sedcveiftn gkwndracge krlvvcef

SEQ ID NO: 88
NP_060049 deleted in malignant brain tumors 1 isoform c precursor [Homo sapiens]
gi|8923740|ref|NP_060049.1|[8923740]

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mat_peptide 26..2403 /product="deleted in malignant brain tumors 1 isoform c"
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/note="SRCR" /db_xref="CDD:pfam00530"
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Region 986..1083 /region_name="Scavenger receptor cysteine-rich domain"
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Region 1502..1599 /region_name="Scavenger receptor cysteine-rich domain"
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Region 1756..1864 /region_name="CUB domain" /note="CUB" /db_xref="CDD:pfam00431"
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Region 1885..1976 /region_name="Scavenger receptor cysteine-rich domain" /note="SRCR" /db_xref="CDD:pfam00530"
Region 1998..2106 /region_name="Domain first found in C1r, C1s, uEGF, and bone morphogenetic protein." /note="CUB" /db_xref="CDD:CUB"
Region 1998..2104 /region_name="CUB domain" /note="CUB" /db_xref="CDD:pfam00431"
Region 2117..2371 /region_name="Zona pellucida-like domain" /note="zona_pellucida" /db_xref="CDD:pfam00100"
Region 2117..2368 /region_name="Zona pellucida (ZP) domain" /note="ZP" /db_xref="CDD:ZP"
CDS 1..2403 /gene="DMBT1" /coded_by="NM_017579.1:107..7318" /note="isoform c is encoded by transcript variant 3" /db_xref="LocusID:1755" /db_xref="MIM:601969"
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121 gswgtvcdds wdtndanvvc rqlgcgwams apgnawfgqg sgpialddvr csghesylws
181 cphngwlshn cghgedagvi csaaqpqstl rpeswpvris ppvptegses slalrlvngg
241 drcrgrvevl yrgswgtvcd dywdtndanv vcrqlgcgwa msapgnaqfg qgsgpivldd
301 vrcsghesyl wscphngwlt hncghsedag vicsaplsrp tpspdtwpts hastagpess
361 lalrlvnggd rcqgrvevly rgswgtvcdd swdtsdanvv crqlgcgwat sapgnarfgq
421 gsgpivlddv rcsgyesylw scphngwlsh ncqhsedagv icsdtlptit lpastvgses
481 slalrlvngg drcqgrvevl yrgswgtvcd dswdtndanv vcrqlgcgwa mlapgnarfg
541 qgsgpivldd vrcsgnesyl wscphngwls hncghsedag vicsgpessl alglvnggdr
601 cqgrvevlyr gswgtvcdds wdtndanvvc rqlgcgwats apgnarfgqg sgpivlddvr
661 csghesylws cpnngwlshn cghhedagvi csaaqsrstp rpdtlstitl ppstvgsess
721 ltlrlvngsd rcqgrvevly rgswgtvcdd swdtndanvv crqlgcgwat sapgnarfgq
781 gsgpivlddv rcsghesylw scphngwlsh ncghhedagv icsvsqsrpt pspdtwptsh
841 astagsessl alrlvnggdr cqgrvevlyr gswgtvcdds wdtsdanvvc rrlgcgwats
901 apgnarfgqg sgpivlddvr csgyesylws cphngwlshn cqhsedagvi csaahswstp
961 spdtlptitl pastvgsess lalrlvnggd rcqgrvevly qgswgtvcdd swdtndanvv
1021 crqlgcgwam sapgnarfgq gsgpivlddv rcsghesylw scphngwlsh ncghsedagv
1081 icsasqsrpt pspdtwptsh astagsessl alrlvnggdr cqgrvevlyr gswgtvcddy
1141 wdtndanvvc rqlgcgwams apgnarfgqg sgpivlddvr csghesylws cphdgwlshn
1201 cghhedagvi csasqsqptp spdtwptsha stagsessla lrlvnggdrc qgrvevlyrg
1261 pwgtvcddyw dtndanvvcr qlgcgwatsa pgnarfgqgs gpivlddvrc sghesylwsc
1321 phngwlshnc ghhedagvic sasqsqptps pdtwptshas tagsesslal rlvnggdrcq
1381 grvevlyrgs wgtvcddywd tndanvvcrq lgcgwatsap gsarfgqgsg pialddvrcs
1441 ghesylwscp hngwlshncg hhedagvics asqsqptpsp dtwptsrast agsestlalr
1501 lvnggdrcrg rvevlyqgsw gtvcddywdt ndanvvcrql gcgwamsapg naqfgqgsgp
1561 ivlddvrcsg hesylwscph ngwlshncgh hedagvicsa aqsqstprpd twlttnlpal
1621 tvgsesslal rlvnggdrcr grvevlyrgs wgtvcddswd tndanvvcrq lgcgwamsap
1681 gnarfgqgsg pivlddvrcs gnesylwscp hkgwlthncg hhedagvics atqinstttd
1741 wwhpttttta rpssncggfl fyasgtfssp sypayypnna kcvweievns gyrinlgfsn
1801 lkleahhncs fdyveifdgs lnssllgki cndtrqifts synrmtihfr sdisfqntgf
1861 lawynsfpsd atlrlvnlns syglcagrve iyhggtwgtv cddswtiqea evvcrqlgcg

1921 ravsalgnay fgsgsgpitl ddvecsgtes tlwqcrnrgw fshncnhred agvicsgnhl
1981 stpapflnit rpntdyscgg flsqpsgdfs spfypgnypn nakcvwdiev qnnyrvtvif
2041 rdvqleggcn ydyievfdgp yrsspliarv cdgargsfts ssnfmsirfi sdhsitrrgf
2101 raeyysspsn dstnllclpn hmqasvsrsy lqslgfsasd lvistwngyy ecrpqitpnl
2161 viftipysgc gtfkqadndt idysnfltaa vsggiikrrt dlrihvscrm lqntwvdtmy
2221 iandtihvan ntiqveevqy gnfdvnisfy tsssflypvt srpyyvdlnq dlyvqaeilh
2281 sdavltlfvd tcvaspysnd ftsltydlir sgcvrddtyg pysspslria rfrfrafhfl
2341 nrfpsvylrc kmvvcraydp ssrcyrgcvl rskrdvgsyq ekvdvvlgpi qlqtpprree
2401 epr

SEQ ID NO: 89
NP_015568 deleted in malignant brain tumors 1 isoform b precursor [Homo sapiens]
gi|6633801|ref|NP_015568.1|[6633801]
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mat_peptide 26..2413 /product="deleted in malignant brain tumors 1 isoform b"
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Region 1122..1222 /region_name="Scavenger receptor Cys-rich" /note="SR"
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Region 1383..1480 /region_name="Scavenger receptor cysteine-rich domain" /note="SRCR" /db_xref="CDD:pfam00530"
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Region 1643..1740 /region_name="Scavenger receptor cysteine-rich domain" /note="SRCR" /db_xref="CDD:pfam00530"
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Region 2127..2378 /region_name="Zona pellucida (ZP) domain" /note="ZP" /db_xref="CDD:ZP"
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181 cphngwlshn cghgedagvi csaaqpqstl rpeswpvris ppvptegses slalrlvngg
241 drcrgrvevl yrgswgtvcd dywdtndanv vcrqlgcgwa msapgnaqfg qgsgpivldd
301 vrcsghesyl wscphngwlt hncghsedag vicsapqsrp tpspdtwpts hastagpess
361 lalrlvnggd rcqgrvevly rgswgtvcdd swdtsdanvv crqlgcgwat sapgnarfgq
421 gsgpivlddv rcsgyesylw scphngwlsh ncqhsedagv icsaahswst pspdtlptit
481 lpastvgses slalrlvngg drcqgrvevl yrgswgtvcd dswdtndanv vcrqlgcgwa
541 mlapgnarfg qgsgpivldd vrcsgnesyl wscphngwls hncghsedag vicsgpessl
601 alrlvnggdr cqgrvevlyr gswgtvcdds wdtndanvvc rqlgcgwams apgnarfgqg
661 sgpivlddvr csghesylws cpnngwlshn cghhedagvi csaaqsrstp rpdtlstitl
721 ppstvgsess ltlrlvngsd rcqgrvevly rgswgtvcdd swdtndanvv crqlgcgwam
781 sapgnarfgq gsgpivlddv rcsghesylw scphngwlsh ncghhedagv icsvsqsrpt
841 pspdtwptsh astagsessl alrlvnggdr cqgrvevlyr gswgtvcdds wdtsdanvvc
901 rqlgcgwats apgnarfgqg sgpivlddvr csgyesylws cphngwlshn cqhsedagvi
961 csaahswstp spdtlptitl pastvgsess lalrlvnggd rcqgrvevly qgswgtvcdd
1021 swdtndanvv crqpgcgwam sapgnarfgq gsgpivlddv rcsghesypw
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1081 ncghsedagv icsasqsrpt pspdtwptsh astagsessl alrlvnggdr cqgrvevlyr
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1261 qgrvevlyrg swgtvcddyw dtndanvvcr qlgcgwatsa pgnarfgqgs gpivlddvrc
1321 sghesylwsc phngwlshnc ghhedagvic sasqsqptps pdtwptshas tagsesslal
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1441 pivlddvrcs ghesylwscp hngwlshncg hhedagvics asqsqptpsp dtwptsrast
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1561 naqfgqgsgp ivlddvrcsg hesylwscph ngwlshncgh hedagvicsa aqsqstprpd
1621 twlttnlpal tvgsesslal rlvnggdrcr grvevlyrgs wgtvcddswd tndanvvcrq
1681 lgcgwamsap gnarfgqgsg pivlddvrcs gnesylwscp hkgwlthncg hhedagvics
1741 atqinsttld wwhpttttta rpssncggfl fyasgtfssp sypayypnna kcvweievns
1801 gyrinlgfsn lkleahhncs fdyveifdgs lnssllgki cndtrqifts synrmtihfr
1861 sdisfqntgf lawynsfpsd atlrlvnlns syglcagrve iyhggtwgtv cddswtiqea
1921 evvcrqlgcg ravsalgnay fgsgsgpitl ddvecsgtes tlwqcrnrgw fshncnhred
1981 agvicsgnhl stpapflnit rpntdyscgg flsqpsgdfs spfypgnypn nakcvwdiev
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2101 sdhsitrrgf raeyysspsn dstnllclpn hmqasvsrsy lqslgfsasd lvistwngyy
2161 ecrpqitpnl viftipysgc gtfkqadndt idysnfltaa vsggiikrrt dlrihvscrm
2221 lqntwvdtmy iandtihvan ntiqveevqy gnfdvnisfy tsssflypvt srpyyvdlnq
2281 dlyvqaeilh sdavltlfvd tcvaspysnd ftsltydlir sgcvrddtyg pysspslria
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2401 qlqtpprree epr

SEQ ID NO: 90
NP_004397 deleted in malignant brain tumors 1 isoform a precursor [Homo sapiens]
gi|4758170|ref|NP_004397.1|[4758170]

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mat_peptide 26..1785 /product="deleted in malignant brain tumors 1 isoform a"
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/db_xref="CDD:SR"
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Region 237..334 /region_name="Scavenger receptor cysteine-rich domain"
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Region 1138..1246 /region_name="CUB domain" /note="CUB" /db_xref="CDD:pfam00431"
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Region 1499..1751 /region_name="Zona pellucida-like domain" /note="zona_pellucida" /db_xref="CDD:pfam00100"
Region 1499..1750 /region_name="Zona pellucida (ZP) domain" /note="ZP" /db_xref="CDD:ZP"
CDS 1..1785 /gene="DMBT1" /coded_by="NM_004406.1:107..5464" /db_xref="LocusID:1755" /db_xref="MIM:601969"
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181 cphngwlshn cghgedagvi csaaqpqstl rpeswpvris ppvptegses slalrlvngg
241 drcrgrvevl yrgswgtvcd dywdtndanv vcrqlgcgwa msapgnaqfg qgsgpivldd
301 vrcsghesyl wscphngwlt hncghsedag vicsapqsrp tpspdtwpts hastagpess
361 lalrlvnggd rcqgrvevly rgswgtvcdd swdtsdanvv crqlgcgwat sapgnarfgq
421 gsgpivlddv rcsgyesylw scphngwlsh ncqhsedagv icsaahswst pspdtlptit
481 lpastvgses slalrlvngg drcqgrvevl yqgswgtvcd dswdtndanv vcrqpgcgwa
541 msapgnarfg qgsgpivldd vrcsghesyp wscphngwls hncghsedag vicsasqsrp
601 tpspdtwpts hastagsess lalrlvnggd rcqgrvevly rgswgtvcdd ywdtndanvv
661 crqlgcgwam sapgnarfgq gsgpivlddv rcsghesylw scphngwlsh ncghhedagv
721 icsasqsqpt pspdtwptsh astagsessl alrlvnggdr cqgrvevlyr gswgtvcddy
781 wdtndanvvc rqlgcgwats apgnarfgqg sgpivlddvr csghesylws cphngwlshn
841 cghhedagvi csasqsqptp spdtwptsra stagsestla lrlvnggdrc rgrvevlyqg
901 swgtvcddyw dtndanvvcr qlgcgwamsa pgnaqfgqgs gpivlddvrc sghesylwsc
961 phngwlshnc ghhedagvic saaqsqstpr pdtwlttnlp altvgsessl alrlvnggdr
1021 crgrvevlyr gswgtvcdds wdtndanvvc rqlgcgwams apgnarfgqg sgpivlddvr
1081 csgnesylws cphkgwlthn cghhedagvi csatqinstt tdwwhptttt tarpssncgg
1141 flfyasgtfs spsypayypn nakcvweiev nsgyrinlgf snlkleahhn csfdyveifd
1201 gslnssllig kicndtrqif tssynrmtih frsdisfqnt gflawynsfp sdatlrlvnl
1261 nssyglcagr veiyhggtwg tvcddswtiq eaevvcrqlg cgravsalgn ayfgsgsgpi
1321 tlddvecsgt estlwqcrnr gwfshncnhr edagvicsgn hlstpapfln itrpntdysc
1381 ggflsqpsgd fsspfypgny pnnakcvwdi evqnnyrvtv ifrdvqlegg cnydyievfd
1441 gpyrssplia rvcdgargsf tsssnfmsir fisdhsitrr gfraeyyssp sndstnllcl

1501 pnhmqasvsr sylqslgfsa sdlvistwng yyecrpqitp nlviftipys gcgtfkqadn
1561 dtidysnflt aavsggiikr rtdlrihvsc rmlqntwvdt myiandtihv anntiqveev
1621 qygnfdvnis fytsssflyp vtsrpyyvdl nqdlyvqaei lhsdavltlf vdtcvaspys
1681 ndftsltydl irsgcvrddt ygpysspslr iarfrfrafh flnrfpsvyl rckmvvcray
1741 dpssrcyrgc vlrskrdvgs yqekvdvvlg piqlqtpprr eeepr

SEQ ID NO: 91
LNBOC1 pulmonary surfactant protein C – bovine
gi|7428752|pir||LNBOC1[7428752]
FEATURES Location/Qualifiers source 1..34 /organism="Bos taurus"
/db_xref="taxon:9913"
Protein 1..34 /product="pulmonary surfactant protein C" /note="pulmonary surfactant protein PSP-6"
Site 4 /site_type="binding" /note="palmitate (Cys) (covalent)"
Site 5 /site_type="binding" /note="palmitate (Cys) (covalent)"
ORIGIN 1 lipccpvnik rllivvvvvv llvvvivgal lmgl

SEQ ID NO: 92
LNDGC1 pulmonary surfactant protein C – dog gi|7428750|pir||LNDGC1[7428750]
FEATURES Location/Qualifiers source 1..35 /organism="Canis familiaris"
/db_xref="taxon:9615"
Protein 1..35 /product="pulmonary surfactant protein C"
Site 5 /site_type="binding" /note="palmitate (Cys) (covalent)"
ORIGIN 1 lgipcfpssl krlliivvvi vlvvvvivga llmgl //

SEQ ID NO: 93
JN0450 conglutinin precursor – bovine gi|346501|pir||JN0450[346501]

FEATURES Location/Qualifiers source 1..371 /organism="Bos taurus"
/db_xref="taxon:9913"
Protein 1..371 /product="conglutinin precursor" /note="C3b-binding protein"
Region 1..20 /region_name="domain" /note="signal sequence"
Region 21..371 /region_name="product" /note="conglutinin"
Region 46..214 /region_name="region" /note="collagen-like"
Site 63 /site_type="binding" /note="carbohydrate (Lys) (covalent)"
Site 63 /site_type="modified" /note="5-hydroxylysine (Lys)"
Region 75..371 /region_name="product" /note="conglutinin-N"
Site 78 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 87 /site_type="binding" /note="carbohydrate (Lys) (covalent)"
Site 87 /site_type="modified" /note="5-hydroxylysine (Lys)"
Site 96 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 99 /site_type="binding" /note="carbohydrate (Lys) (covalent)"
Site 99 /site_type="modified" /note="5-hydroxylysine (Lys)"
Site 108 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 111 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 129 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 132 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 135 /site_type="binding" /note="carbohydrate (Lys) (covalent)"
Site 135 /site_type="modified" /note="5-hydroxylysine (Lys)"
Site 141 /site_type="binding" /note="carbohydrate (Lys) (covalent)"
Site 141 /site_type="modified" /note="5-hydroxylysine (Lys)"
Site 147 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 153 /site_type="modified" /note="4-hydroxyproline (Pro)"

Site 159 /site_type="binding" /note="carbohydrate (Lys) (covalent)"
Site 159 /site_type="modified" /note="5-hydroxylysine (Lys)"
Site 162 /site_type="binding" /note="carbohydrate (Lys) (covalent)"
Site 162 /site_type="modified" /note="5-hydroxylysine (Lys)"
Site 171 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 195 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 198 /site_type="binding" /note="carbohydrate (Lys) (covalent)"
Site 198 /site_type="modified" /note="5-hydroxylysine (Lys)"
Site 210 /site_type="binding" /note="carbohydrate (Lys) (covalent)"
Site 210 /site_type="modified" /note="5-hydroxylysine (Lys)"
Region 248..369 /region_name="domain" /note="C-type lectin homology #label LCH"
Site 337 /site_type="binding" /note="carbohydrate (Asn) (covalent)"
ORIGIN 1 mlllplsvll lltqpwrslg aemttfsqki lanactlvmc splesglpgh dgqdgrecph
61 gekgdpgspg pagragrpgw vgpigpkgdn gfvgepgpkg dtgprgppgm pgpagregps
121 gkqgsmgppg tpgpkgetgp kggvgapgiq gfpgpsglkg ekgapgetga pgragvtgps
181 gaigpqgpsg argppglkgd rgdpgetgak gesglaevna lkqrvtildg hlrrfqnafs
241 qykkavlfpd gqavgekifk tagavksysd aeqlcreakg qlasprssae neavtqmvra
301 qeknaylsmn distegrfty ptgeilvysn wadgepnnsd egqpencvei fpdgkwndvp
361 cskqllvice f

SEQ ID NO: 94
A45225 pulmonary surfactant protein D precursor – human
gi|346375|pir||A45225[346375]
FEATURES Location/Qualifiers source 1..375 /organism="Homo sapiens" /db_xref="taxon:9606"
Protein 1..375 /product="pulmonary surfactant protein D precursor" /note="SP-D"
Region 1..20 /region_name="domain" /note="signal sequence"
Region 21..375 /region_name="product" /note="pulmonary surfactant protein D"
Region 21..45 /region_name="domain" /note="non-collagenous"
Region 46..222 /region_name="domain" /note="collagenous"
Site 90 /site_type="binding" /note="carbohydrate (Asn) (covalent)"
Region 223..375 /region_name="domain" /note="non-collagenous"
Region 254..373 /region_name="domain" /note="C-type lectin homology #label LCH"
Bond bond(281,373) /bond_type="disulfide"
Bond bond(351,365) /bond_type="disulfide"
ORIGIN 1 mllfllsalv lltqplgyle aemktyshrt mpsactlvmc ssvesglpgr dgrdgregpr
61 gekgdpglpg aagqagmpgq agpvgpkgdn gsvgepgpkg dtgpsgppgp pgvpgpagre
121 galgkqgnig pqgkpgpkge agpkgevgap gmqgsagarg lagpkgergv pgergvpgnt
181 gaagsagamg pqgspgargp pglkgdkgip gdkgakgesg lpdvaslrqq vealqgqvqh
241 lqaafsqykk velfpngqsv gekifktagf vkpfteaqll ctqaggqlas prsaaenaal
301 qqlvvaknea aflsmtdskt egkftyptge slvysnwapg epnddggsed cveiftngkw
361 ndracgekrl vvcef

SEQ ID NO: 95
LNHUC pulmonary surfactant protein C precursor, long splice form – human
gi|71983|pir||LNHUC[71983]

FEATURES Location/Qualifiers source 1..197 /organism="Homo sapiens" /db_xref="taxon:9606"
Protein 1..197 /product="pulmonary surfactant protein C precursor, long splice form" /note="3.7 kDa surfactant polypeptide; pulmonary surfactant protein SP5; pulmonary surfactant proteolipid SP-C; pulmonary surfactant proteolipid SPL(pVal)"
Region 1..197 /region_name="product" /note="pulmonary surfactant protein C precursor, short splice form"
Region 1..145 /region_name="product" /note="pulmonary surfactant protein C precursor, short splice form"
Region 1..23 /region_name="domain" /note="propeptide"
Region 24..58 /region_name="product" /note="pulmonary surfactant protein C"
Site 28 /site_type="binding" /note="palmitate (Cys) (covalent)"
Site 29 /site_type="binding" /note="palmitate (Cys) (covalent)"
Region 152..197 /region_name="product" /note="pulmonary surfactant protein C precursor, short splice form" ORIGIN 1 mdvgskevlm esppdysaap rgrfgipccp vhlkrllivv vvvvlivvvi vgallmglhm
61 sqkhtemvle msigapeaqq rlalsehlvt tatfsigstg lvvydyqqll iaykpapgtc
121 cyimkiapes ipslealnrk vhnfqmecsl qakpavptsk lgqaegrdag sapsggdpaf
181 lgmavntlcg evplyyi

SEQ ID NO: 96
LNDGPS pulmonary surfactant protein A precursor – dog
gi|71970|pir||LNDGPS[71970]
FEATURES Location/Qualifiers source 1..248 /organism="Canis familiaris" /db_xref="taxon:9615"
Protein 1..248 /product="pulmonary surfactant protein A precursor" /note="pulmonary surfactant 32K apoprotein; pulmonary surfactant-associated protein PSP-A"
Region 1..17 /region_name="domain" /note="signal sequence"
Region 18..248 /region_name="product" /note="pulmonary surfactant protein A"
Site 20 /site_type="binding" /note="carbohydrate (Asn) (covalent)"
Region 28..102 /region_name="region" /note="collagen-like"
Site 30 /site_type="modified" /note="4-hydroxyproline (Pro)"
Region 127..246 /region_name="domain" /note="C-type lectin homology #label LCH"
Site 207 /site_type="binding" /note="carbohydrate (Asn) (covalent)"
ORIGIN 1 mwlrclalal tllmvsgien ntkdvcvgnp gipgtpgshg lpgrdgrdgv kgdpgppgpl
61 gppggmpghp gpngmtgapg vagergekge pgergppglp asldeelqtt lhdlrhqilq
121 tmgvlslhes llvvgrkvfs sgaqsinfnd iqelcagagg qiaapmspee neavasivkk
181 yntyaylglv espdsgdfqy mdgapvnytn wypgeprgrg keqcvemytd gqwnnknclq
241 yrlaicef

SEQ ID NO: 97
LNHUPS pulmonary surfactant protein A precursor (genomic clone) – human
gi|71967|pir||LNHUPS[71967]
FEATURES Location/Qualifiers source 1..248 /organism="Homo sapiens" /db_xref="taxon:9606"
Protein 1..248 /product="pulmonary surfactant protein A precursor (genomic clone)" /note="alveolar proteinosis protein; pulmonary surfactant 32K apoprotein; pulmonary surfactant-associated protein (PSP-A)"
Region 1..20 /region_name="domain" /note="signal sequence"
Region 21..248 /region_name="product" /note="pulmonary surfactant protein A"
Bond bond(26) /bond_type="disulfide" /note="interchain"

Region 28..100 /region_name="domain" /note="collagenous"
Site 30 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 33 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 36 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 42 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 51 /site_type="modified" /note="5-hydroxylysine (Lys)"
Site 57 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 63 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 76 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 79 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 82 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 88 /site_type="modified" /note="5-hydroxylysine (Lys)"
Site 91 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 97 /site_type="modified" /note="4-hydroxyproline (Pro)"
Region 127..246 /region_name="domain" /note="C-type lectin homology #label LCH"
Bond bond(155,246) /bond_type="disulfide"
Site 207 /site_type="binding" /note="carbohydrate (Asn) (covalent)"
Bond bond(224,238) /bond_type="disulfide"
ORIGIN 1 mwlcplalnl ilmaasgavc evkdvcvgsp gipgtpgshg lpgrhgrdgl kgdlgppgpm
61 gppgempcpp gndglpgapg ipgecgekge pgergppglp ahldeelqat lhdfrhqilq
121 trgalslqgs imtvgekvfs sngqsitfda iqeacaragg riavprnpee neaiasfvkk
181 yntyayvglt egpspgdfry sdgtpvnytn wyrgepagrg keqcvemytd gqwndrncly
241 srlticef

SEQ ID NO: 98
A53570 collectin-43 – bovine gi|1083017|pir||A53570[1083017]

FEATURES Location/Qualifiers source 1..301 /organism="Bos taurus"
/db_xref="taxon:9913"
Protein 1..301 /product="collectin-43" /note="lectin CL-43"
Region 177..299 /region_name="domain" /note="C-type lectin homology #label LCH"

ORIGIN 1 eemdvysekt ltdpctlvvc appadslrgh dgrdgkegpq gekgdpgppg mpgpagregp
61 sgrqgsmgpp gtpgpkgepg peggvgapgm pgspgpaglk gergapgpgg aigpqgpsga
121 mgppglkgdr gdpgekgarg etsvlevdtl rqrmrnlege vqrlqnivtq yrkavlfpdg
181 qavgekifkt agavksysda eqlcreakgq lasprssaen eavtqlvrak nkhaylsmnd
241 iskegkftyp tggsldysnw apgepnnrak degpenclei ysdgnwndie creerlvice 301
f

SEQ ID NO: 99
S33603 surfactant protein D – bovine gi|423283|pir||S33603[423283

FEATURES Location/Qualifiers source 1..369 /organism="Bos taurus"
/db_xref="taxon:9913"
Protein 1..369 /product="surfactant protein D"
Region 248..367 /region_name="domain" /note="C-type lectin homology #label LCH"
ORIGIN 1 mlllplsvll lltqpwrslg aemkiysqkt manactlvmc sppedglpgr dgrdgregpr
61 gekgdpgspg pagragmpgp agpiglkgdn gsagepgpkg dtgppgppgm pgpagregps

121 gkqgsmgppg tpgpkgdtgp kggvgapgiq gspgpaglkg ergapgdpga pgragapgpr
181 gaigpqgpsg argppglkgd rgtpgergak gesglaevna lrqrvgileg qlqrlqnafs
241 qykkamlfpn grsvgekifk tvgsektfqd aqqictqagg qlpsprsgae nealtqlata
301 qnkaaflsms dtrkegtfiy ptgeplvysn wapqepnndg gsencveifp ngkwndkvcg
361 eqrlvicef

SEQ ID NO: 100
AAF28384 lung surfactant protein A [Sus scrofa]
gi|6782434|gb|AAF28384.1|AF133668_1[6782434]
FEATURES Location/Qualifiers source 1..116 /organism="Sus scrofa" /db_xref="taxon:9823"
Protein <1..116 /product="lung surfactant protein A" /function="involved in the innate immune system and lipid homeostasis within the lung" /name="collectin; SPA; SP-A"
CDS 1..116 /gene="SFTPA" /coded_by="AF133668.1:<1..353"
ORIGIN 1 avgekvfstn gqsvafdvir elcaraggri aaprspeene aiasivkkhn tyaylglveg
61 ptagdffyld gtpvnytnwy pgeprgrgke kcvemytdgq wndrncqqyr laicef

SEQ ID NO: 101
AAF22145 lung surfactant protein D precursor; SPD; SP-D; CP4 [Sus scrofa]
gi|6760482|gb|AAF22145.2|AF132496_1[6760482]
sig_peptide 1..20
mat_peptide 21..378 /product="lung surfactant protein D"
CDS 1..378 /gene="SFTPD" /coded_by="AF132496.2:44..1180"
ORIGIN 1 mlllplsvli lltqpprslg aemktysqra vanacalvmc spmenglpgr dgrdgregpr
61 gekgdpglpg avgragmpgl agpvgpkgdn gstgepgakg digpcgppgp pgipgpagke
121 gpsgqqgnig ppgtpgpkge tgpkgevgal gmqgstgarg paglkgerga pgergapgsa
181 gaagpagatg pqgpsgargp pglkgdrgpp gergakgesg lpgitalrqq vetlqgqvqr
241 lqkafsqykk velfpngrgv gekifktggf ektfqdaqqv ctqaggqmas prseteneal
301 sqlvtaqnka aflsmtdikt egnftyptge plvyanwapg epnnnggssg aencveifpn
361 gkwndkacge lrlvicef

SEQ ID NO: 102
P15783 PULMONARY SURFACTANT-ASSOCIATED PROTEIN C (SP-C) (PULMONARY SURFACTANT-ASSOCIATED PROTEOLIPID SPL(VAL))
gi|131422|sp|P15783|PSPC_BOVIN[131422]

FEATURES Location/Qualifiers source 1..34 /organism="Bos taurus" /db_xref="taxon:9913"
gene 1..34 /gene="SFTPC" /note="SFTP2"
Protein 1..34 /gene="SFTPC" /product="PULMONARY SURFACTANT-ASSOCIATED PROTEIN C"
Site 4 /gene="SFTPC" /site_type="lipid-binding" /note="PALMITATE (BY SIMILARITY)."
Site 5 /gene="SFTPC" /site_type="lipid-binding" /note="PALMITATE (BY SIMILARITY)."
Region 21 /gene="SFTPC" /region_name="Conflict" /note="L -> V (IN REF. 2)."
Region 26 /gene="SFTPC" /region_name="Conflict" /note="I -> V (IN REF. 2)."
Region 28..34 /gene="SFTPC" /region_name="Conflict" /note="GALLMGL -> IGAMLAM (IN REF. 2)."
ORIGIN 1 lipccpvnik rllivvvvvv llvvvivgal lmgl

SEQ ID NO: 103
P35246 PULMONARY SURFACTANT-ASSOCIATED PROTEIN D PRECURSOR (SP-D) (PSP-D)
gi|464485|sp|P35246|PSPD_BOVIN[464485]

FEATURES Location/Qualifiers source 1..369 /organism="Bos taurus" /db_xref="taxon:9913"
gene 1..369 /gene="SFTPD" /note="SFTP4"
Protein 1..369 /gene="SFTPD" /product="PULMONARY SURFACTANT-ASSOCIATED PROTEIN D PRECURSOR"
Region 1..20 /gene="SFTPD" /region_name="Signal" /note="BY SIMILARITY."
Region 21..369 /gene="SFTPD" /region_name="Mature chain" /note="PULMONARY SURFACTANT-ASSOCIATED PROTEIN D."
Region 46..216 /gene="SFTPD" /region_name="Domain" /note="COLLAGEN-LIKE."
Site 78 /gene="SFTPD" /site_type="hydroxylation" /note="(BY SIMILARITY)."
Site 87 /gene="SFTPD" /site_type="hydroxylation" /note="(BY SIMILARITY)."
Site 90 /gene="SFTPD" /site_type="glycosylation" /note="POTENTIAL."
Site 96 /gene="SFTPD" /site_type="hydroxylation" /note="(BY SIMILARITY)."
Site 99 /gene="SFTPD" /site_type="hydroxylation" /note="(BY SIMILARITY)."
Site 165 /gene="SFTPD" /site_type="hydroxylation" /note="(BY SIMILARITY)."
Site 171 /gene="SFTPD" /site_type="hydroxylation" /note="(BY SIMILARITY)."
Region 217..248 /gene="SFTPD" /region_name="Domain" /note="COILED COIL (POTENTIAL)."
Region 273..369 /gene="SFTPD" /region_name="Domain" /note="C-TYPE LECTIN (SHORT FORM)."
Bond bond(275,367) /gene="SFTPD" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(345,359) /gene="SFTPD" /bond_type="disulfide" /note="BY SIMILARITY."
ORIGIN 1 mlllplsvll lltqpwrslg aemkiysqkt manactlvmc sppedglpgr dgrdgregpr
61 gekgdpgspg pagragmpgp agpiglkgdn gsagepgpkg dtgppgppgm pgpagregps

121 gkqgsmgppg tpgpkgdtgp kggvgapgiq gspgpaglkg ergapgepga pgragapgpa
181 gaigpqgpsg argppglkgd rgtpgergak gesglaevna lrqrvgileg qlqrlqnafs
241 qykkamlfpn grsvgekifk tvgsektfqd aqqictqagg qlpsprsgae nealtqlata
301 qnkaaflsms dtrkegtfiy ptgeplvysn wapqepnndg gsencveifp ngkwndkvcg
361 eqrlvicef

SEQ ID NO: 104
P42916 COLLECTIN-43 (CL-43) gi|1168967|sp|P42916|CL43_BOVIN[1168967]
FEATURES Location/Qualifiers source 1..301 /organism="Bos taurus" /db_xref="taxon:9913"
Protein 1..301 /product="COLLECTIN-43"
Region 29..142 /region_name="Domain" /note="COLLAGEN-LIKE (G-X-Y)."
Region 202..301 /region_name="Domain" /note="C-TYPE LECTIN (SHORT FORM)."
Bond bond(204,299) /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(277,291) /bond_type="disulfide" /note="BY SIMILARITY."
ORIGIN 1 eemdvysekt ltdpctlvvc appadslrgh dgrdgkegpq gekgdpgppg mpgpagregp
61 sgrqgsmgpp gtpgpkgepg peggvgapgm pgspgpaglk gergapgpgg aigpqgpsga
121 mgppglkgdr gdpgekgarg etsvlevdtl rqrmrnlege vqrlqnivtq yrkavlfpdg
181 qavgekifkt agavksysda eqlcreakgq lasprssaen eavtqlvrak nkhaylsmnd
241 iskegkftyp tggsldysnw apgepgnrak degpenclei ysdgnwndie creerlvice
301 f

SEQ ID NO: 105
CAB56155 DMBT1/8kb.2 protein [Homo sapiens]
gi|5912464|emb|CAB56155.1|[5912464]
sig_peptide 1..26
mat_peptide 26..2412 /product="DMBT1/8kb.2 protein"
CDS 1..2412 /gene="DMBT1" /coded_by="AJ243212.1:107..7345"
/note="Sequence is an alternative splice form of the DMBT1 gene that is expressed in human adult trachea. Isoforms of DMBT1 are identical to the collectin binding protein gp-340. Full-length cDNA clone contains 1 bp deletions in codons 100 and 1751, that were corrected by comparison with the genomic exons"
ORIGIN 1 mgistvilem cllwgqvlst ggwiprttdy aslipsevpl dttvaegspf pseltlestv
61 aegspisles tlettvaegs lipsestles tvaegsdsgl alrlvngdgr cqgrveilyr
121 gswgavcdds wdtndanvvc rqlgcgwams apgnawfgqg sgpialddvr csghesylws
181 cphngwlshn cghgedagvi csaaqpqstl rpeswpvris ppvptegses slalrlvngg
241 drcrgrvevl yrgswgtvcd dywdtndanv vcrqlgcgwa msapgnaqfg qgsgpivldd
301 vrcsghesyl wscphngwlt hncghsedag vicsapqsrp tpspdtwpts hastagpess
361 lalrlvnggd rcqgrvevly rgswgtvcdd swdtsdanvv crqlgcgwat sapgnarfgq
421 gsgpivlddv rcsgyesylw scphngwlsh ncqhsedagv icsaahswst pspdtlptit
481 lpastvgses slalrlvngg drcqgrvevl yrgswgtvcd dswdtndanv vcrqlgcgwa
541 mlapgnarfg qgsgpivldd vrcsgnesyl wscphngwls hncghsedag vicsgpessl
601 alrlvnggdr cqgrvevlyr gswgtvcdds wdtndanvvc rqlgcgwams apgnarfgqg
661 sgpivlddvr csghesylws cpnngwlshn cghhedagvi csaaqsrstp rpdtlstitl
721 ppstvgsess ltlrlvngsd rcqgrvevly rgswgtvcdd swdtndanvv crqlgcgwat
781 sapgnarfgq gsgpivlddv rcsghesylw scphngwlsh ncghhedagv icsvsqsrpt
841 pspdtwptsh astagpessl alrlvnggdr cqgrvevlyr gswgtvcdds wdtsdanvvc
901 rqlgcgwats apgnarfgqg sgpivlddvr csgyesylws cphngwlshn cqhsedagvi
961 csaahswstp spdtlptitl pastvgsess lalrlvnggd rcqgrvevly qgswgtvcdd
1021 swdtndanvv crqlgcgwam sapgnarfgq gsgpivldda rcsghesylw scphngwlsh

1081 ncghsedagv icsasqsrpt pspdtwptsh astagsessl alrlvnggdr cqgrvevlyr
1141 gswgtvcddy wdtndanvac rqlgcgwams apgnarfgqg sgpivlddvr csghesylws
1201 cphngwlshn cghhedagvi csasqsqptp spdtwptsha stagsessla lrlvnggdrc
1261 qgrvevlyrg swgtvcddyw dtndanvvcr qlgcgwatsa pgnarfgqgs gpivlddvrc
1321 sghesylwsc phngwlshnc ghhedagvic sasqsqptps pdtwptshas tagsesslal
1381 rlvnggdrcq grvevlyrgs wgtvcddywd tndanvvcrq lgcgwatsap gnarfgqgsg
1441 pivlddvrcs ghesylwscp hngwlshncg hhedagvics afqsqptpsp dtwptsrast
1501 agsestlalr lvnggdrcrg rvevlyqgsw gtvcddywdt ndanvvcrql gcgwamsapg
1561 naqfgqgsgp ivlddvrcsg hepylwscph ngwlshncgh hedagvicsa aqsqstprpd
1621 twlttnlpal tvgsesslal rlvnggdrcr grvevlyrgs wgtvcddswd tndanvvcrq
1681 lgcgwamsap gnarfgqgsg pivlgdvrcs gnesylwscp hkgwlthncg hhedagvics
1741 atqinstttd wwhpttttta rpssncggfl fyasgtfssp sypayypnna kcvweievns
1801 gyrinlgfsn lkleahhncs fdyveifdgs lnsslllgki cndtrqifts synrmtihfr
1861 sdisfqntgf lawynsfpsd atlrlvnlns syglcagrve iyhggtwgav cddswtiqea
1921 evvcrqlgcg ravsalgnay fgsgsgpitl ddvecsgtes tlwqcrnrgw fshncnhred
1981 agvicsgnhl stpapflnit rpnnyscggf lsqpsgdfss pfypgnypnn akcvwdievq
2041 nnyrvtvifr dvqleggcny dyievfdgpy rsspliarvc dgargsftss snfmsirfis
2101 dhsitrrgfr aeyysspsnd stnllclpnh mqasvsrsyl qslgfsasdl vistwngyye
2161 crpqitpnlv iftipysgcg tfkqadndti dysnlltaav sggiikrrtd lrihvscrml
2221 qntwvdtmyi andtihvann tiqveevqyg nfdvnisfyt sssflypvts rpyyvdlnqd
2281 lyvqaeilhs davltlfvdt cvaspysndf tsltydlirs gcvrddtygp ysspslriar
2341 frfrafhfln rfpsvylrck mvvcraydps srcyrgcvlr skrdvgsyqe kvdvvlgpiq
2401 lqtpprreee pr

SEQ ID NO: 106
AAD49696 gp-340 variant protein [Homo sapiens]
gi|5733598|gb|AAD49696.1|AF159456_1[5733598]
FEATURES Location/Qualifiers source 1..2413 /organism="Homo sapiens"
/db_xref="taxon:9606" /chromosome="10" /map="10q25.3-26.1"
Protein 1..2413 /product="gp-340 variant protein" /name="scavenger receptor
cysteine-rich protein SRCR" /note="putative receptor for SP-D"
CDS 1..2413 /gene="DMBT1" /coded_by="AF159456.1:107..7348"
ORIGIN 1 mgistvilem cllwgqvlst ggwiprttdy aslipsevpl dqtvaegspf psestlesta
61 aegspisles tlestvaegs lipsestles tvaegsdsgl alrlvngdgr cqgrveilyr
121 gswgtvcdds wdtndanvvc rqlgcgwams apgnawfgqg sgpialddvr csghesylws
181 cphngwlshn cghgedagvi csaaqpqstl rpeswpvris ppvptegses slalrlvngg
241 drcrgrvevl yrgswgtvcd dywdtndanv vcrqlgcgwa msapgnaqfg qgsgpivldd
301 vrcsghesyl wscphngwlt hncghsedag vicsapqsrp tpspdtwpts hastagpess
361 lalrlvnggd rcqgrvevly rgswgtvcdd swdtsdanvv crqlgcgwat sapgnarfgq
421 gsgpivlddv rcsgyesylw scphngwlsh ncqhsedagv icsaahswst pspdtlptit
481 lpastvgses slalrlvngg drcqgrvevl yrgswgtvcd dswdtndanv vcrqlgcgwa
541 mlapgnarfg qgsgpivldd vrcsgnesyl wscphngwls hncghsedag vicsgpessl
601 alrlvnggdr cqgrvevlyr gswgtvcdds wdtndanvvc rqlgcgwams apgnarfgqg
661 sgpivlddvr csghesylws cpnngwlshn cghhedagvi csaaqsrstp rpdtlstitl
721 ppstvgsess ltlrlvngsd rcqgrvevly rgswgtvcdd swdtndanvv crqlgcgwam
781 sapgnarfgq gsgpivlddv rcsghesylw scphngwlsh ncghhedagv icsvsqsrpt
841 pspdtwptsh astagsessl alrlvnggdr cqgrvevlyr gswgtvcdds wdtsdanvvc
901 rqlgcgwats apgnarfgqg sgpivlddvr csgyesylws cphngwlshn cqhsedagvi
961 csaahswstp spdtlptitl pastvgsess lalrlvnggd rcqgrvevly qgswgtvcdd
1021 swdtndanvv crqpgcgwam sapgnarfgq gsgpivlddv rcsghesypw scphngwlsh
1081 ncghsedagv icsasqsrpt pspdtwptsh astagsessl alrlvnggdr cqgrvevlyr
1141 gswgtvcddy wdtndanvvc rqlgcgwams apgnarfgqg sgpivlddvr csghesylws
1201 cphngwlshn cghhedagvi csasqsqptp spdtwptsha stagsessla lrlvnggdrc

1261 qgrvevlyrg swgtvcddyw dtndanvvcr qlgcgwatsa pgnarfgqgs gpivlddvrc
1321 sghesylwsc phngwlshnc ghhedagvic sasqsqptps pdtwptshas tagsesslal
1381 rlvnggdrcq grvevlyrgs wgtvcddywd tndanvvcrq lgcgwatsap gnarfgqgsg
1441 pivlddvrcs ghesylwscp hngwlshncg hhedagvics asqsqptpsp dtwptsrast
1501 agsestlalr lvnggdrcrg rvevlyqgsw gtvcddywdt ndanvvcrql gcgwamsapg
1561 naqfgqgsgp ivlddvrcsg hesylwscph ngwlshncgh hedagvicsa aqsqstprpd
1621 twlttnlpal tvgsesslal rlvnggdrcr grvevlyrgs wgtvcddswd tndanvvcrq
1681 lgcgwamsap gnarfgqgsg pivlddvrcs gnesylwscp hkgwlthncg hhedagvics
1741 atqinstttd wwhpttttta rpssncggfl fyasgtfssp sypayypnna kcvweievns
1801 gyrinlgfsn lkleahhncs fdyveifdgs lnsslllgki cndtrqifts synrmtihfr
1861 sdisfqntgf lawynsfpsd atlrlvnlns syglcagrve iyhggtwgtv cddswtiqea
1921 evvcrqlgcg ravsalgnay fgsgsgpitl ddvecsgtes tlwqcrnrgw fshncnhred
1981 agvicsgnhl stpapflnit rpntdyscgg flsqpsgdfs spfypgnypn nakcvwdiev
2041 qnnyrvtvif rdvqleggcn ydyievfdgp yrsspliarv cdgargsfts ssnfmsirfi
2101 sdhsitrrgf raeyysspsn dstnllclpn hmqasvsrsy lqslgfsasd lvistwngyy
2161 ecrpqitpnl viftipysgc gtfkqadndt idysnfltaa vsggiikrrt dlrihvscrm
2221 lqntwvdtmy iandtihvan ntiqveevqy gnfdvnisfy tsssflypvt srpyyvdlnq
2281 dlyvqaeilh sdavltlfvd tcvaspysnd ftsltydlir sgcvrddtyg pysspslria
2341 rfrfrafhfl nrfpsvylrc kmvvcraydp ssrcyrgcvl rskrdvgsyq ekvdvvlgpi
2401 qlqtpprree epr

SEQ ID NO:107
AAD31380 surfactant protein D precursor [Mus musculus]
gi|4877556|gb|AAD31380.1|AF047742_1[4877556]
sig_peptide 1..19
mat_peptide 20..374 /product="surfactant protein D"
CDS 1..374 /gene="Sftp4"
/coded_by="join(AF047741.1:5705..5900,AF047742.1:312..428,
AF047742.1:669..785,AF047742.1:1112..1228,
AF047742.1:1977..2093,AF047742.1:3162..3245, AF047742.1:5010..5386)"
ORIGIN 1 mlpflsmlvl lvqplgnlga emkslsqrsv pntctlvmcs ptenglpgrd grdgregprg
61 ekgdpglpgp mglsglqgpt gpvgpkgeng sagepgpkge rglsgppglp gipgpagkeg
121 psgkqgnigp qgkpgpkgea gpkgevgapg mqgstgakgs tgpkgergap
gvqgapgnag
181 aagpagpagp qgapgsrgpp glkgdrgvpg drgikgesgl pdsaalrqqm ealkgklqrl
241 evafshyqka alfpdgrsvg dkifrtadse kpfedaqemc kqaggqlasp rsatenaaiq
301 qlitahnkaa flsmtdvgte gkftyptgep lvysnwapge pnnnggaenc veiftngqwn
361 dkacgeqrlv icef

SEQ ID NO: 108
B61249 pulmonary surfactant protein C – dog gi|539712|pir||B61249[539712]
FEATURES Location/Qualifiers source 1..35 /organism="Canis familiaris"
/db_xref="taxon:9615"
Protein 1..35 /product="pulmonary surfactant protein C"
ORIGIN 1 lgipcfpssl krlliivvvi vlvvvvivga llmgl

SEQ ID NO: 109
S00609 pulmonary surfactant protein C – bovine gi|89749|pir||S00609[89749]

FEATURES Location/Qualifiers source 1..34 /organism="Bos taurus"
/db_xref="taxon:9913"
Protein 1..34 /product="pulmonary surfactant protein C" /note="pulmonary surfactant protein PSP-6"

Site 4 /site_type="binding" /note="palmitate (Cys) (covalent)"
Site 5 /site_type="binding" /note="palmitate (Cys) (covalent)"
ORIGIN 1 lipccpvnik rllivvvvvv llvvvivgal lmgl

SEQ ID NO: 110
A43628 pulmonary surfactant protein A - human (fragments)
gi|280854|pir||A43628[280854]
FEATURES Location/Qualifiers source 1..35 /organism="Homo sapiens"
/db_xref="taxon:9606"
Protein 1..35 /product="pulmonary surfactant protein A"
ORIGIN 1 gqsitfdagk eqcvemytdg qwndrnclyl ticef

SEQ ID NO: 111
AAB48076 Surfactant protein B (SP-B) [Oryctolagus cuniculus]
gi|1850933|gb|AAB48076.1|[1850933]
FEATURES Location/Qualifiers source 1..370 /organism="Oryctolagus cuniculus"
/db_xref="taxon:9986" /tissue_type="liver"
Protein 1..370 /product="Surfactant protein B (SP-B)"
CDS 1..370 /gene="SP-B"
/coded_by="join(U40853.1:2194..2263,U40853.1:2591..2718,
U40853.1:2941..3012,U40853.1:3257..3382,
U40853.1:3590..3727,U40853.1:3925..4014,
U40853.1:6043..6226,U40853.1:6421..6581,
U40853.1:7266..7346,U40853.1:7829..7891)" /note="Surfactant protein B (SP-B) is
a key component of lung surfactant, a surface active material secreted by type II
epithelial cells of lung alveolus; SP-B maintains biophysical properties and
physiological function of surfactant; Pulmonary surfactant associated protein"
ORIGIN 1 makshlppwl llllptlcg pgtavwatsp lacaqgpefw cqsleqalqc kalghclqev
61 wghvgaddlc qecqdivnil tkmtkeaifq dtirkflehe cdvlplkllv pqchhvldvy
121 fpltityfls qinakaicqh lglcqpgspe ppldplpdkl vlptllgalp akpgphtqdl
181 saqrfpiplp lcwlcrtllk riqamipkgv lamavaqvch vvplvvggic qclaerytvi
241 llevllghvl pqlvcglvlr cssvdsigqv pptlealpge wlpqdpecpl cmsvttqarn
301 iseqtrpqav yhaclssqld kqeceqfvel htpqllslls rgwdaraicq algacvatls
361 plqciqsphf

SEQ ID NO: 112
1901176A surfactant protein A gi|382753|prf||1901176A[382753]
FEATURES Location/Qualifiers source 1..247 /organism="Oryctolagus cuniculus"
/db_xref="taxon:9986"
ORIGIN 1 mlllslaltl isapasdtcd tkdvcigspg ipgtpgshgl pgrdgrdgvk gdpgppgpmg
61 ppggmpglpg rdgligapgv pgergdkgep gergppglpa yldeelqatl helrhhalqs
121 igvlslqgsm kavgekifst ngqsvnfdai revcaraggr iaivkevprs leeneaiasr
181 ntyaylglae gptagdfyyl dgdpvnytnw ypgeprgqgr ekcvemytdg kwndknclqy
241 rlvicef

SEQ ID NO: 113
CAA53510 lung surfactant protein D [Bos taurus]
gi|415939|emb|CAA53510.1|[415939]
sig_peptide 1..20
mat_peptide 21..369 /product="lung surfactant protein D"
CDS 1..369 /coded_by="X75911.1:102..1211" /db_xref="SWISS-PROT:P35246"
ORIGIN 1 mlllplsvll lltqpwrslg aemkiysqkt manactlvmc sppedglpgr dgrdgregpr

61 gekgdpgspg pagragmpgp agpiglkgdn gsagepgpkg dtgppgppgm pgpagregps
121 gkqgsmgppg tpgpkgdtgp kggvgapgiq gspgpaglkg ergapgepga pgragapgpa
181 gaigpqgpsg argppglkgd rgtpgergak gesglaevna lrqrvgileg qlqrlqnafs
241 qykkamlfpn grsvgekifk tvgsektfqd aqqictqagg qlpsprsgae nealtqlata
301 qnkaaflsms dtrkegtfiy ptgeplvysn wapqepnndg gsencveifp ngkwndkvcg
361 eqrlvicef

SEQ ID NO: 114
CAA53511 collectin-43 [Bos taurus] gi|499385|emb|CAA53511.1|[499385]

FEATURES Location/Qualifiers source 1..301 /organism="Bos taurus" /db_xref="taxon:9913" /tissue_type="liver" /clone_lib="lambda gt 11"
Protein 1..301 /product="collectin-43"
mat_peptide 1..301 /product="collectin-43"
CDS 1..301 /coded_by="X75912.1:<1..906" /db_xref="SWISS-PROT:P42916"
ORIGIN 1 eemdvyxekt ltdpctlvvc appadslrgh dgrdgkegpq gekgdpgppg mpgpagregp
61 sgrqgsmgpp gtpgpkgepg peggvgapgm pgspgpaglk gergapgpgg aigpqgpsga
121 mgppglkgdr gdpgekgarg etsvlevdtl rqrmrnlege vqrlqnivtq yrkavlfpdg
181 qavgekifkt agavksysda eqlcreakgq lasprssaen eavtqlvrak nkhaylsmnd
241 iskegkftyp tggsldysnw apgepgnrak degpenclei ysdgnwndie creerlvice
301 f

SEQ ID NO: 115
CAA46152 lung surfactant protein D [Homo sapiens]
gi|34767|emb|CAA46152.1|[34767]

sig_peptide 1..20
mat_peptide 21..375 /product="lung surfactant protein D"
CDS 1..375 /gene="hsp-D" /coded_by="X65018.1:172..1299" /db_xref="SWISS-PROT:P35247"
ORIGIN 1 mllfllsalv lltqplgyle aemktyshrt tpsactlvmc ssvesglpgr dgrdgregpr
61 gekgdpglpg aagqagmpgq agpvgpkgdn gsvgepgpkg dtgpsgppgp pgvpgpagre
121 gplgkqgnig pqgkpgpkge agpkgevgap gmqgsagarg lagpkgergv pgergvpgna
181 gaagsagamg pqgspgargp pglkgdkgip gdkgakgesg lpdvaslrqq vealqgqvqh
241 lqaafsqykk velfpngqsv gekifktagf vkpfteaqll ctqaggqlas prsaaenaal
301 qqlvvaknea aflsmtdskt egkftyptge slvysnwapg epnddggsed cveiftngkw
361 ndracgekrl vvcef

SEQ ID NO: 116
AAA92788 lung surfactant protein C [Rattus norvegicus]
gi|595282|gb|AAA92788.1|[595282]
FEATURES Location/Qualifiers source 1..194 /organism="Rattus norvegicus" /db_xref="taxon:10116" /clone="sp-c" /tissue_type="liver"
Protein 1..194 /product="lung surfactant protein C"
CDS 1..194 /gene="sp-c"
/coded_by="join(U07796.1:1673..1714,U07796.1:2841..2999, U07796.1:3252..3377,U07796.1:3598..3707, U07796.1:4053..4200)"
ORIGIN 1 mdmgskevlm esppdystgp rsqfripccp vhlkrllivv vvvvlvvvvi vgallmglhm

61 sqkhtemvle msiggapetq krlalsehtd tiatfsigst givlydyqrl ltaykpapgt
121 ycyimkmape sipslealar kfknfqakss tptsklgqee ghsagsdsds sgrdlaflgl
181 avstlcgvlp lyyi

SEQ ID NO: 117
AAA31468 surfactant protein A [Oryctolagus cuniculus]
gi|431446|gb|AAA31468.1|[431446]

FEATURES Location/Qualifiers source 1..247 /organism="Oryctolagus cuniculus"
/strain="New Zealand White" /db_xref="taxon:9986" /tissue_type="liver"
/dev_stage="adult"
Protein 1..247 /product="surfactant protein A"
CDS 1..247 /coded_by="join(L19387.1:3864..4032,L19387.1:4241..4360,
L19387.1:5010..5087,L19387.1:5533..5909)"
ORIGIN 1 mlllslaltl isapasdtcd tkdvcigspg ipgtpgshgl pgrdgrdgvk gdpgppapwa
61 ppggmpglpg rdgligapgv pgergdkgep gergppglpa yldeelqatl helrhhalqs
121 igvlslqgsm kavgekifst ngqsvnfdai revcaraggr iavprsleen eaiasivker
181 ntyaylglae gptagdfyyl dgdpvnytnw ypgeprgqgr ekcvemytdg kwndknclqy
241 rlvicef

Mannose binding lectin

SEQ ID NO: 1
NP_034897 mannan-binding lectin serine protease 2 [Mus musculus]
gi|6754642|ref|NP_034897.1|[6754642]

sig_peptide 1..15
mat_peptide 16..185 /product="mannan-binding lectin serine protease 2"
Region 28..137 /region_name="Domain first found in C1r, C1s, uEGF, and bone morphogenetic protein" /note="CUB" /db_xref="CDD:smart00042"
Region 28..134 /region_name="CUB domain" /note="CUB" /db_xref="CDD:pfam00431"
Region 138..180 /region_name="Calcium-binding EGF-like domain" /note="EGF_CA" /db_xref="CDD:smart00179"
variation 172 /allele="I" /allele="V" /db_xref="dbSNP:3167338"
CDS 1..185 /gene="Masp2" /coded_by="NM_010767.1:32..589" /db_xref="LocusID:17175" /db_xref="MGD:1330832"
ORIGIN 1 mrlliflgll wslvatllgs kwpepvfgrl vspgfpekya dhqdrswtlt appgyrlrly
61 fthfdlelsy rceydfvkls sgtkvlatlc gqestdteqa pgndtfyslg pslkvtfhsd
121 ysnekpftgf eafyaaedvd ecrvslgdsv pcdhychnyl ggyycscrag yvlhqnkhtc
181 seqsl

SEQ ID NO: 2
AAH10760 Similar to mannose binding lectin, serum (C) [Mus musculus]
gi|14789670|gb|AAH10760.1|[14789670]

source 1..244 /organism="Mus musculus" /strain="FVB/N" /db_xref="taxon:10090"
/clone="MGC:18500 IMAGE:4212216" /tissue_type="Liver, normal. 5 month old male mouse." /clone_lib="NCI_CGAP_Li9" /lab_host="DH10B" /note="Vector: pCMV-SPORT6"
Protein 1..244 /product="Similar to mannose binding lectin, serum (C)"

CDS 1..244 /coded_by="BC010760.1:192..926"
ORIGIN 1 msiftsflll cvvtvvyaet ltegvqnscp vvtcsspgln gfpgkdgrdg akgekgepgq
61 glrglqgppg kvgptgppgn pglkgavgpk gdrgdraefd tseidseiaa lrselralrn
121 wvlfslsekv gkkyfvssvk kmsldrvkal csefqgsvat prnaeensai qkvakdiayl
181 gitdvrvegs fedltgnrvr ytnwndgepn ntgdgedcvv ilgngkwndv pcsdsflaic
241 efsd

SEQ ID NO: 3
AAH21762 mannose binding lectin, liver (A) [Mus musculus]
gi|18256010|gb|AAH21762.1|[18256010]

source 1..239 /organism="Mus musculus" /strain="FVB/N" /db_xref="taxon:10090"
/clone="MGC:30242 IMAGE:5132514" /tissue_type="Liver, normal. 5 month old
male mouse." /clone_lib="NCI_CGAP_Li9" /lab_host="DH10B" /note="Vector:
pCMV-SPORT6"
Protein 1..239 /product="mannose binding lectin, liver (A)"
/db_xref="LocusID:17194"
CDS 1..239 /coded_by="BC021762.1:75..794" /db_xref="LocusID:17194"

ORIGIN 1 mlllpllpvl lcvvsvsssg sqtcedtlkt csviacgrdg rdgpkgekge pgqglrglqg
61 ppgklgppgs vgspgspgpk gqkgdhgdnr aieeklanme aeirilkskl qltnklhafs
121 mgkksgkklf vtnhekmpfs kvkslctelq gtvaiprnae enkaiqevat giaflgitde
181 ategqfmyvt ggrltysnwk kdepnnhgsg edcviildng lwndiscqas fkavcefpa

SEQ ID NO: 4
Q9NPY3 Complement component C1q receptor precursor (Complement component
1, q subcomponent, receptor 1) (C1qRp) (C1qR(p)) (C1q/MBL/SPA receptor) (CD93
antigen) (CDw93) gi|21759074|sp|Q9NPY3|CD93_HUMAN[21759074]

source 1..652 /organism="Homo sapiens" /db_xref="taxon:9606
gene 1..652 /gene="C1QR1" /note="CD93"
Protein 1..652 /gene="C1QR1" /product="Complement component C1q receptor
precursor"
Region 1..21 /gene="C1QR1" /region_name="Signal"
Region 22..652 /gene="C1QR1" /region_name="Mature chain"
/note="COMPLEMENT COMPONENT C1Q RECEPTOR.
Region 22 /gene="C1QR1" /region_name="Conflict" /note="T -> V (IN AA
SEQUENCE)."
Region 24..580 /gene="C1QR1" /region_name="Domain" /note="EXTRACELLULAR
(POTENTIAL)."
Region 32..174 /gene="C1QR1" /region_name="Domain" /note="C-TYPE LECTIN."
Region 36 /gene="C1QR1" /region_name="Conflict" /note="C -> T (IN AA
SEQUENCE)."
Region 38..39 /gene="C1QR1" /region_name="Conflict" /note="TA -> RI (IN AA
SEQUENCE)."
Region 155 /gene="C1QR1" /region_name="Conflict" /note="S -> N (IN REF. 1)."
Region 186 /gene="C1QR1" /region_name="Conflict" /note="G -> A (IN AA
SEQUENCE)."
Region 260..301 /gene="C1QR1" /region_name="Domain" /note="EGF-LIKE 1."
Bond bond(264,275) /gene="C1QR1" /bond_type="disulfide" /note="BY
SIMILARITY."
Bond bond(271,285) /gene="C1QR1" /bond_type="disulfide" /note="BY
SIMILARITY."

Bond bond(287,300) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Region 302..344 /gene="C1QR1" /region_name="Domain" /note="EGF-LIKE 2."
Bond bond(306,317) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(311,328) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Region 318 /gene="C1QR1" /region_name="Variant" /note="V -> A. /FTId=VAR_013573."
Site 325 /gene="C1QR1" /site_type="glycosylation" /note="N-LINKED (GLCNAC...) (POTENTIAL)."
Bond bond(330,343) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Region 345..384 /gene="C1QR1" /region_name="Domain" /note="EGF-LIKE 3, CALCIUM-BINDING (POTENTIAL)."
Bond bond(349,358) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(354,367) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(369,383) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Region 385..426 /gene="C1QR1" /region_name="Domain" /note="EGF-LIKE 4, CALCIUM-BINDING (POTENTIAL)."
Bond bond(389,400) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(396,409) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(411,425) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Region 427..468 /gene="C1QR1" /region_name="Domain" /note="EGF-LIKE 5, CALCIUM-BINDING (POTENTIAL)." Bond bond(431,443) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(439,452) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(454,467) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Region 492 /gene="C1QR1" /region_name="Conflict" /note="S -> A (IN AA SEQUENCE)."
Region 496 /gene="C1QR1" /region_name="Conflict" /note="R -> Q (IN AA SEQUENCE)."
Region 504 /gene="C1QR1" /region_name="Conflict" /note="R -> G (IN AA SEQUENCE)."
Region 541 /gene="C1QR1" /region_name="Conflict" /note="P -> S (IN REF. 1)."
Region 581..601 /gene="C1QR1" /region_name="Transmembrane region" /note="POTENTIAL."
Region 594..601 /gene="C1QR1" /region_name="Domain" /note="POLY-LEU."
Region 602..652 /gene="C1QR1" /region_name="Domain" /note="CYTOPLASMIC (POTENTIAL)."
ORIGIN 1 matsmglll lllllltqpga gtgadteavv cvgtacytah sgklsaaeaq nhcnqnggnl
61 atvkskeeaq hvqrvlaqll rreaaltarm skfwiglqre kgkcldpslp lkgfswvggg
121 edtpysnwhk elrnsciskr cvslldlsq pllpsrlpkw segpcgspgs pgsniegfvc
181 kfsfkgmcrp lalggpgqvt yttpfqttss sleavpfasa anvacgegdk detqshyflc
241 kekapdvfdw gssgplcvsp kygcnfnngg chqdcfeggd gsflcgcrpg frlldlvtc

301 asrnpcsssp crggatcvlg phgknytcrc pqgyqldssq ldcvdvdecq dspcaqecvn
361 tpggfrcecw vgyepggpge gacqdvdeca lgrspcaqgc tntdgsfhcs ceegyvlage
421 dgtqcqdvde cvgpggplcd slcfntqgsf hcgclpgwvl apngvsctmg pvslgppsgp
481 pdeedkgeke gstvpraata sptrgpegtp katpttsrps lssdapitsa plkmlapsgs
541 pgvwrepsih hataasgpqe paggdssvat qnndgtdgqk lllfyilgtv vaillllala
601 lgllvyrkrr akreekkekk pqnaadsysw vperaesram enqysptpgt dc

SEQ ID NO: 5
O89103 Complement component C1q receptor precursor (Complement component 1, q subcomponent, receptor 1) (C1qRp) (C1qR(p)) (C1q/MBL/SPA receptor) (CD93 antigen) (Cell surface antigen AA4) (Lymphocyte antigen 68)
gi|21541998|sp|O89103|CD93_MOUSE[21541998

source 1..644 /organism="Mus musculus" /db_xref="taxon:10090"
gene 1..644 /gene="C1QR1" /note="CD93; C1QRP; LY68; AA4"
Protein 1..644 /gene="C1QR1" /product="Complement component C1q receptor precursor"
Region 1..22 /gene="C1QR1" /region_name="Signal" /note="POTENTIAL."
Region 23..644 /gene="C1QR1" /region_name="Mature chain" /note="COMPLEMENT COMPONENT C1Q RECEPTOR."
Region 23..572 /gene="C1QR1" /region_name="Domain" /note="EXTRACELLULAR (POTENTIAL)."
Region 31..173 /gene="C1QR1" /region_name="Domain" /note="C-TYPE LECTIN."
Site 102 /gene="C1QR1" /site_type="glycosylation" /note="N-LINKED (GLCNAC...) (POTENTIAL)."
Region 257..298 /gene="C1QR1" /region_name="Domain" /note="EGF-LIKE 1."
Bond bond(261,272) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(268,282) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(284,297) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Region 299..341 /gene="C1QR1" /region_name="Domain" /note="EGF-LIKE 2."
Bond bond(303,314) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(308,325) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Site 322 /gene="C1QR1" /site_type="glycosylation" /note="N-LINKED (GLCNAC...) (POTENTIAL)."
Bond bond(327,340) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Region 342..381 /gene="C1QR1" /region_name="Domain" /note="EGF-LIKE 3, CALCIUM-BINDING (POTENTIAL)."
Bond bond(346,355) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(351,364) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(366,380) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Region 382..423 /gene="C1QR1" /region_name="Domain" /note="EGF-LIKE 4, CALCIUM-BINDING (POTENTIAL)."
Bond bond(386,397) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."

Bond bond(393,406) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(408,422) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Region 424..465 /gene="C1QR1" /region_name="Domain" /note="EGF-LIKE 5, CALCIUM-BINDING (POTENTIAL)."
Bond bond(428,440) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(436,449) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(451,464) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Region 573..593 /gene="C1QR1" /region_name="Transmembrane region" /note="POTENTIAL."
Region 594..644 /gene="C1QR1" /region_name="Domain" /note="CYTOPLASMIC (POTENTIAL)."
ORIGIN 1 maistglfll lgllgqpwag aaadsqavvc egtacytahw gklsaaeaqh rcnenggnla
61 tvkseeearh vqqaltqllk tkapleakmg kfwiglqrek gnctyhdlpm rgfswvggge
121 dtaysnwyka sksscifkrc vslildlslt phpshlpkwh espcgtpeap gnsiegflck
181 fnfkgmcrpl alggpgrvty ttpfqattss leavpfasva nvacgdeaks ethyflcnek
241 tpgifhwgss gplcvspkfg csfnnggcqq dcfeggdgsf rcgcrpgfrl lddlvtcasr
301 npcssnpctg ggmchsvpls enytcrcpsg yqldssqvhc vdidecqdsp caqdcvntlg
361 sfhcecwvgy qpsgpkeeac edvdecaaan spcaqgcint dgsfycscke gyivsgedst
421 qcedidecsd argnpcdslc fntdgsfrcg cppgwelapn gvfcsrgtvf selparppqk
481 ednddrkest mpptempssp sgskdvsnra qttglfvqsd iptasvplei eipsevsdvw
541 felgtylptt sghskpthed svsahsdtdg qnlllfyilg tvvaislllv lalgiliyhk
601 rrakkeeike kkpqnaadsy swvperaesq apenqysptp gtdc

SEQ ID NO: 6
P09871 Complement C1s component precursor (C1 esterase)
gi|115205|sp|P09871|C1S_HUMAN[115205]

source 1..688 /organism="Homo sapiens" /db_xref="taxon:9606"
gene 1..688 /gene="C1S"
Protein 1..688 /gene="C1S" /product="Complement C1s component precursor" /EC_number="3.4.21.42"
Region 1..15 /gene="C1S" /region_name="Signal"
Region 16..437 /gene="C1S" /region_name="Mature chain" /note="COMPLEMENT C1S HEAVY CHAIN." Region 16..130 /gene="C1S" /region_name="Domain" /note="CUB 1."
Bond bond(65,83) /gene="C1S" /bond_type="disulfide"
Region 131..172 /gene="C1S" /region_name="Domain" /note="EGF-LIKE, CALCIUM-BINDING (POTENTIAL)."
Bond bond(135,147) /gene="C1S" /bond_type="disulfide"
Bond bond(143,156) /gene="C1S" /bond_type="disulfide"
Site 149 /gene="C1S" /site_type="hydroxylation" /note="(PROBABLE)."
Bond bond(158,171) /gene="C1S" /bond_type="disulfide"
Site 174 /gene="C1S" /site_type="glycosylation" /note="N-LINKED (GLCNAC...)."
Region 175..290 /gene="C1S" /region_name="Domain" /note="CUB 2."
Bond bond(175,202) /gene="C1S" /bond_type="disulfide" Bond bond(234,251) /gene="C1S" /bond_type="disulfide" Region 293..355 /gene="C1S" /region_name="Domain" /note="SUSHI 1."
Bond bond(294,341) /gene="C1S" /bond_type="disulfide"

Region 294 /gene="C1S" /region_name="Conflict" /note="C -> K (IN REF. 6)."
Bond bond(321,354) /gene="C1S" /bond_type="disulfide"
Region 358..422 /gene="C1S" /region_name="Domain" /note="SUSHI 2."
Bond bond(359,403) /gene="C1S" /bond_type="disulfide"
Bond bond(386,421) /gene="C1S" /bond_type="disulfide"
Site 406 /gene="C1S" /site_type="glycosylation" /note="N-LINKED (GLCNAC...)."
Bond bond(425,549) /gene="C1S" /bond_type="disulfide" /note="INTERCHAIN."
Region 438..688 /gene="C1S" /region_name="Mature chain" /note="COMPLEMENT C1S LIGHT CHAIN." Region 438..688 /gene="C1S" /region_name="Domain" /note="SERINE PROTEASE."
Site 475 /gene="C1S" /site_type="active" /note="CHARGE RELAY SYSTEM."
Region 513 /gene="C1S" /region_name="Conflict" /note="G -> GG (IN REF. 5)."
Site 529 /gene="C1S" /site_type="active" /note="CHARGE RELAY SYSTEM."
Region 573 /gene="C1S" /region_name="Conflict" /note="T -> A (IN REF. 7)."
Bond bond(595,618) /gene="C1S" /bond_type="disulfide"
Bond bond(628,659) /gene="C1S" /bond_type="disulfide"
Site 632 /gene="C1S" /site_type="active" /note="CHARGE RELAY SYSTEM."
Region 645..646 /gene="C1S" /region_name="Conflict" /note="TK -> GR (IN REF. 7)."
ORIGIN 1 mwcivlfsll awvyaeptmy geilspnypq aypseveksw dievpegygi hlyfthldie
61 lsencaydsv qiisgdteeg rlcgqrssnn phspiveefq vpynklqvif ksdfsneerf
121 tgfaayyvat dinectdfvd vpcshfcnnf iggyfcscpp eyflhddmkn cgvncsgdvf
181 taligeiasp nypkpypens rceyqirlek gfqvvvtlrr edfdveaads agncldslvf
241 vagdrqfgpy cghgfpgpln ietksnaldi ifqtdltgqk kgwklryhgd pmpcpkedtp
301 nsvwepakak yvfrdvvqit cldgfevveg rvgatsfyst cqsngkwsns klkcqpvdcg
361 ipesiengkv edpestlfgs virytceepy yymengggge yhcagngswv nevlgpelpk
421 cvpvcgvpre pfeekqriig gsdadiknfp wqvffdnpwa ggalineywv ltaahvvegn
481 reptmyvgst svqtsrlaks kmltpehvfi hpgwkllevp egrtnfdndi alvrlkdpvk
541 mgptvspicl pgtssdynlm dgdlglisgw grtekrdrav rlkaarlpva plrkckevkv
601 ekptadaeay vftpnmicag gekgmdsckg dsggafavqd pndktkfyaa glvswgpqcg
661 tyglytrvkn yvdwimktmq enstpred

SEQ ID NO: 7
NP_036204 complement component 1, q subcomponent, receptor 1; complement component C1q receptor [Homo sapiens]
gi|6912282|ref|NP_036204.1|[6912282]

source 1..652 /organism="Homo sapiens" /db_xref="taxon:9606" /chromosome="20" /map="20p11.21"
Protein 1..652 /product="complement component 1, q subcomponent, receptor 1" /note="complement component C1q receptor"
Region 32..130 /region_name="smart00034, CLECT, C-type lectin (CTL) or carbohydrate-recognition domain (CRD); Many of these domains function as calcium-dependent carbohydrate binding modules"
Region 47..128 /region_name="pfam00059, lectin_c, Lectin C-type domain. This family includes both long and short form C-type"
Region 385..426 /region_name="smart00179, EGF_CA, Calcium-binding EGF-like domain"
CDS 1..652 /gene="C1QR1" /coded_by="NM_012072.2:149..2107" /note="Clq/MBL/SPA receptor" /db_xref="LocusID:22918" /db_xref="MIM:120577"
ORIGIN 1 matsmglll lllltqpga gtgadteavv cvgtacytah sgklsaaeaq nhcnqnggnl
61 atvkskeeaq hvqrvlaqll rreaaltarm skfwiglqre kgkcldpslp lkgfswvggg
121 edtpysnwhk elrnsciskr cvslldlsq pllpnrlpkw segpcgspgs pgsniegfvc

181 kfsfkgmcrp lalggpgqvt yttpfqttss sleavpfasa anvacgegdk detqshyflc
241 kekapdvfdw gssgplcvsp kygcnfnngg chqdcfeggd gsflcgcrpg frlldd lvtc
301 asrnpcsssp crggatcvlg phgknytcrc pqgyqldssq ldcvdvdecq dspcaqecvn
361 tpggfrcecw vgyepggpge gacqdvdeca lgrspcaqgc tntdgsfhcs ceegyvlage
421 dgtqcqdvde cvgpggplcd slcfntqgsf hcgclpgwvl apngvsctmg pvslgppsgp
481 pdeedkgeke gstvpraata sptrgpegtp katpttsrps lssdapitsa plkmlapsgs
541 sgvwrepsih hataasgpqe paggdssvat qnndgtdgqk lllfyilgtv vaillllala
601 lgllvyrkrr akreekkekk pqnaadsysw vperaesram enqysptpgt dc

SEQ ID NO: 8
NP_000233 soluble mannose-binding lectin precursor; mannose-binding lectin; mannose binding protein; Mannose-binding lectin 2, soluble (opsonic defect) [Homo sapiens]
gi|4557739|ref|NP_000233.1|[4557739]

sig_peptide 1..20
mat_peptide 21..248 /product="soluble mannose-binding lectin"
variation 54 /allele="D" /allele="G" /db_xref="dbSNP:1800450"
variation 57 /allele="E" /allele="G" /db_xref="dbSNP:1800451"
Region 134..245 /region_name="smart00034, CLECT, C-type lectin (CTL) or carbohydrate-recognition domain (CRD); Many of these domains function as calcium-dependent carbohydrate binding modules"
Region 144..246 /region_name="pfam00059, lectin_c, Lectin C-type domain. This family includes both long and short form C-type"
CDS 1..248 /gene="MBL2" /coded_by="NM_000242.1:66..812"
/db_xref="LocusID:4153" /db_xref="MIM:154545"
ORIGIN 1 mslfpslpll llsmvaasys etvtcedaqk tcpaviacss pgingfpgkd grdgtkgekg
61 epgqglrglq gppgklgppg npgpsgspgp kgqkgdpgks pdgdsslaas erkalqtema
121 rikkwltfsl gkqvgnkffl tngeimtfek vkalcvkfqa svatprnaae ngaiqnlike
181 eaflgitdek tegqfvdltg nrltytnwne gepnnagsde dcvlllkngq wndvpcstsh
241 lavcefpi

SEQ ID NO: 9
P11226 Mannose-binding protein C precursor (MBP-C) (MBP1) (Mannan-binding protein) (Mannose-binding lectin) gi|126676|sp|P11226|MABC_HUMAN[126676]

source 1..248 /organism="Homo sapiens" /db_xref="taxon:9606"
gene 1..248 /gene="MBL2" /note="MBL"
Protein 1..248 /gene="MBL2" /product="Mannose-binding protein C precursor"
Region 1..20 /gene="MBL2" /region_name="Signal"
Region 21..248 /gene="MBL2" /region_name="Mature chain" /note="MANNOSE-BINDING PROTEIN C." Region 21..41 /gene="MBL2" /region_name="Domain" /note="CYS-RICH."
Region 24 /gene="MBL2" /region_name="Variant" /note="T -> A (IN CHINESE). /FTId=VAR_013294."
Region 42..99 /gene="MBL2" /region_name="Domain" /note="COLLAGEN-LIKE."
Site 47 /gene="MBL2" /site_type="hydroxylation"
Region 52 /gene="MBL2" /region_name="Variant" /note="R -> C (IN 0.05% OF EUROPEAN AND AFRICAN POPULATIONS). /FTId=VAR_008543."
Region 54 /gene="MBL2" /region_name="Variant" /note="G -> D (IN CAUCASIAN AND CHINESE POPULATIONS). /FTId=VAR_004182."
Region 57 /gene="MBL2" /region_name="Variant" /note="G -> E (IN WEST AFRICAN POPULATION). /FTId=VAR_004183."

Site 73 /gene="MBL2" /site_type="hydroxylation"
Site 79 /gene="MBL2" /site_type="hydroxylation"
Site 82 /gene="MBL2" /site_type="hydroxylation"
Site 88 /gene="MBL2" /site_type="hydroxylation"
Region 109 /gene="MBL2" /region_name="Hydrogen bonded turn"
Region 110..129 /gene="MBL2" /region_name="Helical region"
Region 130 /gene="MBL2" /region_name="Hydrogen bonded turn"
Region 132..134 /gene="MBL2" /region_name="Beta-strand region"
Region 135..136 /gene="MBL2" /region_name="Hydrogen bonded turn"
Region 137..147 /gene="MBL2" /region_name="Beta-strand region"
Region 148..157 /gene="MBL2" /region_name="Helical region"
Region 153..246 /gene="MBL2" /region_name="Domain" /note="C-TYPE LECTIN (SHORT FORM)."
Bond bond(155,244) /gene="MBL2" /bond_type="disulfide"
Region 158..159 /gene="MBL2" /region_name="Hydrogen bonded turn"
Region 161..162 /gene="MBL2" /region_name="Beta-strand region"
Region 168..177 /gene="MBL2" /region_name="Helical region"
Region 182..187 /gene="MBL2" /region_name="Beta-strand region"
Region 192..193 /gene="MBL2" /region_name="Hydrogen bonded turn"
Region 196..197 /gene="MBL2" /region_name="Beta-strand region"
Region 198..199 /gene="MBL2" /region_name="Hydrogen bonded turn"
Region 202 /gene="MBL2" /region_name="Beta-strand region"
Region 208 /gene="MBL2" /region_name="Beta-strand region"
Region 210..211 /gene="MBL2" /region_name="Hydrogen bonded turn"
Region 216..218 /gene="MBL2" /region_name="Helical region"
Bond bond(222,236) /gene="MBL2" /bond_type="disulfide"
Region 222..225 /gene="MBL2" /region_name="Beta-strand region"
Region 227..228 /gene="MBL2" /region_name="Hydrogen bonded turn"
Region 231..234 /gene="MBL2" /region_name="Beta-strand region"
Region 236..237 /gene="MBL2" /region_name="Hydrogen bonded turn"
Region 239..248 /gene="MBL2" /region_name="Beta-strand region"

ORIGIN 1 mslfpslpll llsmvaasys etvtcedaqk tcpaviacss pgingfpgkd grdgtkgekg
61 epgqglrglq gppgklgppg npgpsgspgp kgqkgdpgks pdgdsslaas erkalqtema
121 rikkwltfsl gkqvgnkffl tngeimtfek vkalcvkfqa svatprnaae ngaiqnlike
181 eaflgitdek tegqfvdltg nrltytnwne gepnnagsde dcvlllkngq wndvpcstsh
241 lavcefpi

SEQ ID NO: 10
Q9ET61 Complement component C1q receptor precursor (Complement component 1, q subcomponent, receptor 1) (C1qRp) (C1qR(p)) (C1q/MBL/SPA receptor) (CD93 antigen) (Cell surface antigen AA4) gi|21541989|sp|Q9ET61|CD93_RAT[21541989]

source 1..643 /organism="Rattus norvegicus" /db_xref="taxon:10116"
gene 1..643 /gene="C1QR1" /note="CD93; C1QRP2"
Protein 1..643 /gene="C1QR1" /product="Complement component C1q receptor precursor"
Region 1..23 /gene="C1QR1" /region_name="Signal" /note="POTENTIAL."
Region 24..643 /gene="C1QR1" /region_name="Mature chain" /note="COMPLEMENT COMPONENT C1Q RECEPTOR."
Region 24..571 /gene="C1QR1" /region_name="Domain" /note="EXTRACELLULAR (POTENTIAL)."
Region 31..173 /gene="C1QR1" /region_name="Domain" /note="C-TYPE LECTIN."

Region 257..298 /gene="C1QR1" /region_name="Domain" /note="EGF-LIKE 1."
Bond bond(261,272) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(268,282) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(284,297) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Region 299..341 /gene="C1QR1" /region_name="Domain" /note="EGF-LIKE 2."
Bond bond(303,314) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(308,325) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Site 322 /gene="C1QR1" /site_type="glycosylation" /note="N-LINKED (GLCNAC...) (POTENTIAL)."
Bond bond(327,340) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Region 342..381 /gene="C1QR1" /region_name="Domain" /note="EGF-LIKE 3, CALCIUM-BINDING (POTENTIAL)."
Bond bond(346,355) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(351,364) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(366,380) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Region 382..423 /gene="C1QR1" /region_name="Domain" /note="EGF-LIKE 4, CALCIUM-BINDING (POTENTIAL)."
Bond bond(386,397) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(393,406) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(408,422) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Region 417 /gene="C1QR1" /region_name="Conflict" /note="E -> K (IN REF. 2)."
Region 424..462 /gene="C1QR1" /region_name="Domain" /note="EGF-LIKE 5, CALCIUM-BINDING (POTENTIAL)."
Bond bond(428,437) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(433,446) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Bond bond(448,461) /gene="C1QR1" /bond_type="disulfide" /note="BY SIMILARITY."
Site 498 /gene="C1QR1" /site_type="glycosylation" /note="N-LINKED (GLCNAC...) (POTENTIAL)."
Region 572..592 /gene="C1QR1" /region_name="Transmembrane region" /note="POTENTIAL."
Region 593..643 /gene="C1QR1" /region_name="Domain" /note="CYTOPLASMIC (POTENTIAL)."

ORIGIN 1 mvtstgllll lgllgqlwag aaadseavvc egtacytahw gklsaaeaqh rcnenggnla
61 tvkseeearh vqealaqllk tkapsetkig kfwiglqrek gkctyhdlpm kgfswvggge
121 dttysnwyka sksscskrc vslildlslk phpshlpkwh espcgtpdap gnsiegflck
181 fnfkgmcspl alggpgqlty ttpfqattss lkavpfasva nvvcgdeaes ktnyylcket
241 tagvfhwgss gplcvspkfg csfnnggcqq dcfeggdgsf rcgcrpgfrl lddlvtcasr

301 npcssnpctg ggmchsvpls enytchcprg yqldssqvhc vdidecedsp cdqecintpg
361 gfhcecwvgy qssgskeeac edvdectaay spcaqgctnt dgsfycscke gyimsgedst
421 qcedideclg npcdtlcint dgsfrcgcpa gfelapngvs ctrgsmfsel parppqkedk
481 gdgkestvpl tempgslngs kdvsnraqtt dlsiqsdsst asvpleievs seasdvwldl
541 gtylpttsgh sqpthedsvp ahsdsdtdgq kllfyilgt vvaisllial alglliylkr
601 kakkeeikek kaqnaadsys wiperaesra penqysptpg tdc

SEQ ID NO: 11
NP_006601 mannan-binding lectin serine protease 2, isoform 1 precursor; MBL-associated plasma protein of 19 kD; small MBL-associated protein [Homo sapiens]
gi|21264363|ref|NP_006601.2|[21264363]
sig_peptide 1..15
mat_peptide 16..444 /product="mannan-binding lectin serine protease 2, isoform 1, chain A"
Region 28..136 /region_name="Domain first found in C1r, C1s, uEGF, and bone morphogenetic protein." /note="CUB" /db_xref="CDD:smart00042"
Region 28..134 /region_name="CUB domain" /note="CUB" /db_xref="CDD:pfam00431"
Region 138..180 /region_name="Calcium-binding EGF-like domain" /note="EGF_CA" /db_xref="CDD:smart00179"
variation 155 /allele="H" /allele="R" /db_xref="dbSNP:2273343"
Region 184..295 /region_name="Domain first found in C1r, C1s, uEGF, and bone morphogenetic protein." /note="CUB" /db_xref="CDD:smart00042"
Region 184..293 /region_name="CUB domain" /note="CUB" /db_xref="CDD:pfam00431"
Region 300..361 /region_name="Domain abundant in complement control proteins" /note="CCP" /db_xref="CDD:smart00032"
Region 300..361 /region_name="Sushi domain (SCR repeat)" /note="sushi" /db_xref="CDD:pfam00084"
Region 366..430 /region_name="Domain abundant in complement control proteins" /note="CCP" /db_xref="CDD:smart00032"
Region 366..430 /region_name="Sushi domain (SCR repeat)" /note="sushi" /db_xref="CDD:pfam00084"
variation 377 /allele="A" /allele="V" /db_xref="dbSNP:2273346"
Region 444..679 /region_name="Trypsin-like serine protease" /note="Tryp_SPc" /db_xref="CDD:smart00020" mat_peptide 445..686 /product="mannan-binding lectin serine protease 2, isoform 1, chain B"
Region 445..679 /region_name="Trypsin" /note="trypsin" /db_xref="CDD:pfam00089"
CDS 1..686 /gene="MASP2" /coded_by="NM_006610.2:22..2082" /db_xref="LocusID:10747" /db_xref="MIM:605102"

ORIGIN 1 mrlltllgll cgsvatplgp kwpepvfgrl aspgfpgeya ndqerrwtlt appgyrlrly
61 fthfdlelsh lceydfvkls sgakvlatlc gqestdtera pgkdtfyslg sslditfrsd
121 ysnekpftgf eafyaaedid ecqvapgeap tcdhhchnhl ggfycscrag yvlhrnkrtc
181 salcsgqvft qrsgelsspe yprpypklss ctysisleeg fsvildfves fdvethpetl
241 cpydflkiqt dreehgpfcg ktlphrietk sntvtitfvt desgdhtgwk ihytstaqpc
301 pypmappngh vspvqakyil kdsfsifcet gyellqghlp lksftavcqk dgswdrpmpa
361 csivdcgppd dlpsgrveyi tgpgvttyka viqysceetf ytmkvndgky vceadgfwts
421 skgekslpvc epvcglsart tggriyggqk akpgdfpwqv lilggttaag allydnwvlt
481 aahavyeqkh dasaldirmg tlkrlsphyt qawseavfih egythdagfd ndialiklnn
541 kvvinsnitp iclprkeaes fmrtddigta sgwgltqrgf larnlmyvdi pivdhqkcta
601 ayekppyprg svtanmlcag lesggkdscr gdsggalvfl dseterwfvg givswgsmnc

661 geagqygvyt kvinyipwie niisdf

SEQ ID NO: 12
NP_631947 mannan-binding lectin serine protease 2, isoform 2 precursor; MBL-associated plasma protein of 19 kD; small MBL-associated protein [Homo sapiens] gi|21264361|ref|NP_631947.1|[21264361]
sig_peptide 1..15
mat_peptide 16..185 /product="mannan-binding lectin serine protease 2, isoform 2"
Region 28..136 /region_name="Domain first found in C1r, C1s, uEGF, and bone morphogenetic protein." /note="CUB" /db_xref="CDD:smart00042"
Region 28..134 /region_name="CUB domain" /note="CUB" /db_xref="CDD:pfam00431"
Region 138..180 /region_name="Calcium-binding EGF-like domain" /note="EGF_CA" /db_xref="CDD:smart00179"
variation 155 /allele="H" /allele="R" /db_xref="dbSNP:2273343"
CDS 1..185 /gene="MASP2" /coded_by="NM_139208.1:22..579" /db_xref="LocusID:10747" /db_xref="MIM:605102"
ORIGIN 1 mrlltllgll cgsvatplgp kwpepvfgrl aspgfpgeya ndqerrwtlt appgyrlrly
61 fthfdlelsh lceydfvkls sgakvlatlc gqestdtera pgkdtfyslg ssldltfrsd
121 ysnekpftgf eafyaaedid ecqvapgeap tcdhhchnhl ggfycscrag yvlhrnkrtc
181 seqsl

SEQ ID NO: 13
NP_624302 mannan-binding lectin serine protease 1, isoform 2, precursor; protease, serine, 5 (mannose-binding protein-associated); manan-binding lectin serine protease-1; Ra-reactive factor serine protease p100 [Homo sapiens] gi|21264359|ref|NP_624302.1|[21264359]

sig_peptide 1..19
mat_peptide 20..445 /product="mannan-binding lectin serine protease 1, isoform 2, chain A"
variation 21 /allele="I" /allele="T" /db_xref="dbSNP:1062049"
Region 23..138 /region_name="Domain first found in C1r, C1s, uEGF, and bone morphogenetic protein." /note="CUB" /db_xref="CDD:smart00042"
Region 23..135 /region_name="CUB domain" /note="CUB" /db_xref="CDD:pfam00431"
Region 139..181 /region_name="Calcium-binding EGF-like domain" /note="EGF_CA" /db_xref="CDD:smart00179"
Region 185..294 /region_name="CUB domain" /note="CUB" /db_xref="CDD:pfam00431"
Region 190..296 /region_name="Domain first found in C1r, C1s, uEGF, and bone morphogenetic protein." /note="CUB" /db_xref="CDD:smart00042"
variation 235 /allele="Q" /allele="E" /db_xref="dbSNP:3203210"
variation 258 /allele="P" /allele="A" /db_xref="dbSNP:866085"
Region 301..362 /region_name="Domain abundant in complement control proteins" /note="CCP" /db_xref="CDD:smart00032"
Region 301..362 /region_name="Sushi domain (SCR repeat)" /note="sushi" /db_xref="CDD:pfam00084"
Region 367..432 /region_name="Domain abundant in complement control proteins" /note="CCP" /db_xref="CDD:smart00032"
Region 367..432 /region_name="Sushi domain (SCR repeat)" /note="sushi" /db_xref="CDD:pfam00084" mat_peptide 446..728 /product="mannan-binding lectin serine protease 1, isoform 2, chain B"

Region 449..711 /region_name="Trypsin-like serine protease" /note="Tryp_SPc" /db_xref="CDD:smart00020" Region 450..711 /region_name="Trypsin" /note="trypsin" /db_xref="CDD:pfam00089"
variation 616 /allele="A" /allele="V" /db_xref="dbSNP:2461280"
Region 661..703 /region_name="Immunoglobulin A1 protease" /note="IGA1" /db_xref="CDD:pfam02395"
CDS 1..728 /gene="MASP1" /coded_by="NM_139125.1:51..2237" /db_xref="LocusID:5648" /db_xref="MIM:600521"

ORIGIN 1 mrwlllyyal cfslskasah tvelnnmfgq iqspgypdsy psdsevtwni tvpdgfrikl
61 yfmhfnless ylceydyvkv etedqvlatf cgrettdteq tpgqevvlsp gsfmsitfrs
121 dfsneerftg fdahymavdv deckeredee lscdhychny iggyycscrf gyilhtdnrt
181 crvecsdnlf tqrtgvitsp dfpnpypkss eclytielee gfmvnlqfed ifdiedhpev
241 pcpydyikik vgpkvlgpfc gekapepist qshsvlilfh sdnsgenrgw rlsyraagne
301 cpelqppvhg kiepsqakyf fkdqvlvscd tgykvlkdnv emdtfqiecl kdgtwsnkip
361 tckivdcrap gelehglitf strnnlttyk seikyscqep yykmlnnntg iytcsaqgvw
421 mnkvlgrslp tclpecgqps rslpslvkri iggrnaepgl fpwqalivve dtsrvpndkw
481 fgsgallsas wiltaahvlr sqrrdttvip vskehvtvyl glhdvrdksg avnssaarvv
541 lhpdfniqny nhdialvqlq epvplgphvm pvclprlepe gpaphmlglv agwgisnpnv
601 tvdeiissgt rtlsdvlqyv klpvvphaec ktsyesrsgn ysvtenmfca gyyeggkdtc
661 lgdsggafvi fddlsqrwvv qglvswggpe ecgskqvygv ytkvsnyvdw vweqmglpqs
721 vvepqver

SEQ ID NO: 14
NP_001870 mannan-binding lectin serine protease 1, isoform 1, precursor; protease, serine, 5 (mannose-binding protein-associated); manan-binding lectin serine protease-1; Ra-reactive factor serine protease p100 [Homo sapiens] gi|21264357|ref|NP_001870.3|[21264357]

sig_peptide 1..19
mat_peptide 20..448 /product="mannan-binding lectin serine protease 1, isoform 1, chain A"
variation 21 /allele="I" /allele="T" /db_xref="dbSNP:1062049"
Region 23..138 /region_name="Domain first found in C1r, C1s, uEGF, and bone morphogenetic protein." /note="CUB" /db_xref="CDD:smart00042"
Region 23..135 /region_name="CUB domain" /note="CUB" /db_xref="CDD:pfam00431"
Region 139..181 /region_name="Calcium-binding EGF-like domain" /note="EGF_CA" /db_xref="CDD:smart00179"
Region 185..294 /region_name="CUB domain" /note="CUB" /db_xref="CDD:pfam00431"
Region 190..296 /region_name="Domain first found in C1r, C1s, uEGF, and bone morphogenetic protein." /note="CUB" /db_xref="CDD:smart00042"
variation 235 /allele="Q" /allele="E" /db_xref="dbSNP:3203210"
variation 258 /allele="P" /allele="A" /db_xref="dbSNP:866085"
Region 301..362 /region_name="Domain abundant in complement control proteins" /note="CCP" /db_xref="CDD:smart00032"
Region 301..362 /region_name="Sushi domain (SCR repeat)" /note="sushi" /db_xref="CDD:pfam00084"
Region 367..432 /region_name="Domain abundant in complement control proteins" /note="CCP" /db_xref="CDD:smart00032"
Region 367..432 /region_name="Sushi domain (SCR repeat)" /note="sushi" /db_xref="CDD:pfam00084"

Region 448..691 /region_name="Trypsin-like serine protease" /note="Tryp_SPc"
/db_xref="CDD:smart00020" mat_peptide 449..699 /product="mannan-binding lectin
serine protease 1, isoform 1, chain B"
Region 449..691 /region_name="Trypsin" /note="trypsin"
/db_xref="CDD:pfam00089"
Region 644..675 /region_name="Immunoglobulin A1 protease" /note="IGA1"
/db_xref="CDD:pfam02395"
CDS 1..699 /gene="MASP1" /coded_by="NM_001879.3:51..2150"
/db_xref="LocusID:5648" /db_xref="MIM:600521"

ORIGIN 1 mrwlllyyal cfslskasah tvelnnmfgq iqspgypdsy psdsevtwni tvpdgfrikl
61 yfmhfnless ylceydyvkv etedqvlatf cgrettdteq tpgqevvlsp gsfmsitfrs
121 dfsneerftg fdahymavdv deckeredee lscdhychny iggyycscrf gyilhtdnrt
181 crvecsdnlf tqrtgvitsp dfpnpypkss eclytielee gfmvnlqfed ifdiedhpev
241 pcpydyikik vgpkvlgpfc gekapepist qshsvlilfh sdnsgenrgw rlsyraagne
301 cpelqppvhg kiepsqakyf fkdqvlvscd tgykvlkdnv emdtfqiecl kdgtwsnkip
361 tckivdcrap gelehglitf strnnlttyk seikyscqep yykmlnnntg iytcsaqgvw
421 mnkvlgrslp tclpvcglpk fsrklmarif ngrpaqkgtt pwiamlshln gqpfcggsll
481 gsswivtaah clhqsldped ptlrdsdlls psdfkiilgk hwrlrsdene qhlgvkhttl
541 hpqydpntfe ndvalvelle spvlnafvmp iclpegpqqe gamvivsgwg kqflqrfpet
601 lmeieipivd hstcqkayap lkkkvtrdmi cagekeggkd acagdsggpm vtlnrergqw
661 ylvgtvswgd dcgkkdrygv ysyihhnkdw iqrvtgvrn

SEQ ID NO: 15
XP_122683 similar to mannose binding lectin, liver (A) [Mus musculus]
gi|20872845|ref|XP_122683.1|[20872845]
source 1..239 /organism="Mus musculus" /strain="C57BL/6J"
/db_xref="taxon:10090" /chromosome="14"
Protein 1..239 /product="similar to mannose binding lectin, liver (A)"
Region 126..236 /region_name="C-type lectin (CTL) or carbohydrate-recognition
domain (CRD)" /note="CLECT" /db_xref="CDD:smart00034"
Region 135..237 /region_name="Lectin C-type domain" /note="lectin_c"
/db_xref="CDD:pfam00059"
CDS 1..239 /gene="Mbl1" /coded_by="XM_122683.1:10..729"
/db_xref="LocusID:17194" /db_xref="MGD:96923"
ORIGIN 1 mlllpllpvl lcvvsvsssg sqtcedtlkt csviacgrdg rdgpkgekge pgqglrglqg
61 ppgklgppgs vgspgspgpk gqkgdhgdnr xxxxxxxxxx xxxxxxxxxx xxxxxxhafs
121 mgkksgkklf vtnhekmpfs kvkslctelq gtvaiprnae enkaiqevat giaflgitde
181 ategqfmyvt ggrltysnwk kdepnnhgsg edcviildng lwndiscqas fkavcefpa

SEQ ID NO:16
AAM21196 C-type mannose-binding lectin [Oncorhynchus mykiss]
gi|20385163|gb|AAM21196.1|AF363271_1[20385163]

source 1..185 /organism="Oncorhynchus mykiss" /db_xref="taxon:8022"
Protein 1..185 /product="C-type mannose-binding lectin"
CDS 1..185 /gene="MBL" /coded_by="AF363271.1:25..582"

ORIGIN 1 meklaillll sasialgdan ltqllglepl lktkveqttp eaqveavqeg ikegscpsdw
61 ytygshcfkf vsiqqsfvds eqnclalggn lasvhslley qfmqaltkda nghlhstwlg
121 gfdaikegtw mwsdgsrfdy tnwdtdepnn agegedclhm naasaklwfd vpcewkfasl
181 csrrm

SEQ ID NO: 17
AAD45377 mannose-binding lectin [Sus scrofa]
gi|5566370|gb|AAD45377.1|AF164576_1[5566370]

source 1..240 /organism="Sus scrofa" /db_xref="taxon:9823" /tissue_type="liver"
Protein 1..240 /product="mannose-binding lectin"
CDS 1..240 /coded_by="AF164576.1:1..723"

ORIGIN 1 mslfpslhll llivmtasht etencediqn tclviscdsp ginglpgkdg ldgakgekge
61 pgqgliglqg lpgmvgpqgs pgipglpglk gqkgdsgidp gnslanlrse ldnikkwlif
121 aqgkqvgkkl yltngkkmsf ngvkalcaqf qasvatptns renqaiqela gteaflgitd
181 eytegqfvdl tgkrvryqnw ndgepnnads aehcveilkd gkwndifcss qlsavcefpa

SEQ ID NO: 18
NP_034905 mannose binding lectin, liver (A) [Mus musculus]
gi|6754654|ref|NP_034905.1|[6754654]

source 1..239 /organism="Mus musculus" /db_xref="taxon:10090"
/chromosome="14" /map="14 15.0 cM"
Protein 1..239 /product="mannose binding lectin, liver (A)"
misc_feature 19..239 /partial /note="mature protein based on homology to rat MPB-A"
Region 126..236 /region_name="C-type lectin (CTL) or carbohydrate-recognition domain (CRD)" /note="CLECT" /db_xref="CDD:smart00034"
Region 135..237 /region_name="Lectin C-type domain" /note="lectin_c" /db_xref="CDD:pfam00059"
CDS 1..239 /gene="Mbl1" /coded_by="NM_010775.1:121..840" /db_xref="LocusID:17194" /db_xref="MGD:96923"
ORIGIN 1 mlllpllpvl lcvvsvsssg sqtcedtlkt csviacgrdg rdgpkgekge pgqglrglqg
61 ppgklgppgs vgspgspgpk gqkgdhgdnr aieeklanme aeirilkskl qltnklhafs
121 mgkksgkklf vtnhekmpfs kvkslctelq gtvaiprnae enkaiqevat giaflgitde
181 ategqfmyvt ggrltysnwk kdepnnhgsg edcviildng lwndiscqas fkavcefpa

SEQ ID NO: 19
NP_034906 mannose binding lectin, serum (C) [Mus musculus]
gi|6754656|ref|NP_034906.1|[6754656]

source 1..244 /organism="Mus musculus" /strain="BALB/c" /sub_species="domesticus" /db_xref="taxon:10090" /chromosome="19" /map="19 25.0 cM" /clone="a10" /tissue_type="liver" /clone_lib="lambda gt10"
Protein 1..244 /product="mannose binding lectin, serum (C)"
sig_peptide 1..18
Region 120..241 /region_name="C-type lectin (CTL) or carbohydrate-recognition domain (CRD)" /note="CLECT" /db_xref="CDD:smart00034"
Region 140..242 /region_name="Lectin C-type domain" /note="lectin_c" /db_xref="CDD:pfam00059"
CDS 1..244 /gene="Mbl2" /coded_by="NM_010776.1:177..911" /note="polysaccharide-binding component of RaRF; sequence similarity to mannose-binding proteins" /db_xref="LocusID:17195" /db_xref="MGD:96924"

ORIGIN 1 msiftsflll cvvtvvyaet ltegvqnscp vvtcsspgln gfpgkdgrdg akgekgepgq
61 glrglqgppg kvgptgppgn pglkgavgpk gdrgdraefd tseidseiaa lrselralrn
121 wvlfslsekv gkkyfvssvk kmsldrvkal csefqgsvat prnaeensai qkvakdiayl

181 gitdvrvegs fedltgnrvr ytnwndgepn ntgdgedcvv ilgngkwndv pcsdsflaic
241 efsd

SEQ ID NO: 20
AAL14428 dendritic cell-specific ICAM-3 grabbing nonintegrin [Macaca nemestrina]
gi|16118455|gb|AAL14428.1|AF343727_1[16118455]

source 1..381 /organism="Macaca nemestrina" /db_xref="taxon:9545"
/cell_type="peripheral blood-derived dendritic cells"
Protein 1..381 /product="dendritic cell-specific ICAM-3 grabbing nonintegrin"
/name="membrane-associated mannose binding lectin"
CDS 1..381 /coded_by="AF343727.1:1..1146" /note="DC-SIGN"

ORIGIN 1 msdskeprlq qldlleeeql ggvgfrqtrg ykslagclgh gplvlqllsf tllaglivqv
61 skvpsslsqg qskqdaiyqn ltqlkvavse lsekskqqei yqeltrlkaa vgelpekskq
121 qeiyeeltrl raavgelpek sklqeiyqel trlkaavgel pekskqqeiy qelsrlkaav
181 gdlpekskqq eiyqkltqlk aavdglpdrs kqqeiyqeli qlkaaverlc hpcpwewtff
241 qgncyfmsns qrnwhdsita cqevgaqlvv iksaeeqnfl qlqssrsnrf twmglsdlnh
301 egtwqwvdgs pllpsfkqyw nkgepnnvge edcaefsgng wnddkcnlak
fwickksaas
361 csgdeerlls papttpnppp a

SEQ ID NO: 21
AAF63470 mannose binding-like lectin precursor [Carassius auratus]
gi|7542474|gb|AAF63470.1|AF227739_1[7542474]
source 1..246 /organism="Carassius auratus" /db_xref="taxon:7957"
/tissue_type="liver"
Protein <1..246 /product="mannose binding-like lectin precursor" /name="collectin"
sig_peptide <1..13
Region 14..25 /region_name="N-terminal segment"
Region 26..93 /region_name="collagen-like structure"
Region 60..63 /region_name="break in collagen structure" Region 94..124
/region_name="neck region"
Region 125..246 /region_name="carbohydrate recognition domain" /note="CRD"
CDS 1..246 /gene="MBL" /coded_by="AF227739.1:<1..742" /note="collectin with
structural homology to mannose-binding lectin but with a predicted carbohydrate
specificity for galactose"

ORIGIN 1 llllqfalql ldgaepqnln cpayggvpgt pghnglpgrd grdgkdgaig pkgekgesgv
61 svqgppgkag ppgtagekge rgpsgpqgsp gsesvleslk seiqqlkaki atfekvssvc
121 hfrkvgqkyy itdgvvgnfd qglkscmefg gtmvsprtsa enqallklvv ssglgskkpy
181 igvtdrkteg qfvdtegkql tftnwgpgqp ddykglqdcg viedtglwdd ggcgdirpim
241 ceidik

SEQ ID NO: 22
AAF63469 mannose binding-like lectin precursor [Danio rerio]
gi|7542472|gb|AAF63469.1|AF227738_1[7542472]
sig_peptide 1..23
mat_peptide 24..251 /product="mannose binding-like lectin"
Region 24..36 /region_name="N-terminal segment"
Region 37..101 /region_name="collagen-like structure"
Region 71..74 /region_name="break in collagen structure"
Region 102..132 /region_name="neck region"

Region 133..251 /region_name="carbohydrate recognition domain" /note="CRD"
CDS 1..251 /gene="mbl" /coded_by="AF227738.1:68..823" /note="collectin with structural homology to mannose-binding lectin but with a predicted carbohydrate specificity for galactose"
ORIGIN 1 mallklflga llllqlvlql magaadpqsl ncpayagvpg tpghnglpgr dgrvgrdgan
61 gpkgekgepg vnvqgppgka gppgpagakg ergpsglpgq dcmsdslkse lqklsdkial
121 iekvvnfktf kkvgqkyyvt ddveetfdkg mqycssngga lvlprtleen allkvfvssa
181 fkrlfiritd rekegefvdt drkkltftnw gpnqpdnykg aqdcgaiads glwddvscds
241 lypiiceiei k

SEQ ID NO: 23
AAF63468 mannose binding-like lectin precursor [Cyprinus carpio]
gi|7542470|gb|AAF63468.1|AF227737_1[7542470]

sig_peptide 1..23
mat_peptide 24..256 /product="mannose binding-like lectin"
Region 24..35 /region_name="N-terminal segment"
Region 36..103 /region_name="collagen-like structure"
Region 70..73 /region_name="break in collagen structure"
Region 104..134 /region_name="neck region"
Region 135..256 /region_name="carbohydrate recognition domain" /note="CRD"
CDS 1..256 /gene="MBL" /coded_by="AF227737.1:67..837" /note="collectin with structural homology to mannose-binding lectin but with a predicted carbohydrate specificity for galactose"
ORIGIN 1 malfklflgt llllqfalql ldgaepqnln cpayggvpgt pghnglpgrd grdgkdgaig
61 pkgekgesgv svqgppgkag ppgpagekge rgptgsqgsp gsesvleslk seiqqlkaki
121 atfekvasvg hfrqvgqkyy itdgvvgtfd qglkfckdfg gtmvfprtsa enqallklvv
181 ssglsskkpy igvtdreteg rfvntegkql tftnwgpgqp ddykglqdcg viedsglwdd
241 gscgdirpim ceidnk

SEQ ID NO: 24
AAF21018 mannose-binding lectin 2 [Sus scrofa]
gi|6644342|gb|AAF21018.1|AF208528_1[6644342]

source 1..31 /organism="Sus scrofa" /db_xref="taxon:9823" /chromosome="14" /map="between S0007 and Sw210" Protein <1..>31 /product="mannose-binding lectin 2" /name="MBL2"
CDS 1..31 /gene="MBL2"
/coded_by="join(AF208528.1:<1..25,AF208528.1:703..>771)"
ORIGIN 1 tkgekgepgp gfrgsqgppg kmgppgnige t

SEQ ID NO: 25
AAK30298 mannose-binding lectin precursor protein [Gallus gallus]
gi|13561409|gb|AAK30298.1|[13561409]

sig_peptide 1..21
mat_peptide 22..254 /product="mannose-binding lectin protein"
Region 22..46 /region_name="N-terminal segment"
Region 47..102 /region_name="collagen-like"
Region 66 /region_name="break in collagen-like structure"
Region 103..139 /region_name="neck region"
Region 140..254 /region_name="carbohydrate recognition domain; CRD"
CDS 1..254 /coded_by="AF231714.1:242..1006"

ORIGIN 1 mtllqpfsal llclslmmat sllttdkpee kmyscpiiqc sapavnglpg rdgrdgpkge
61 kgdpgeglrg lqglpgkagp qglkgevgpq gekgqkgerg ivvtddlhrq itdleakirv
121 leddlsrykk alslkdvvnv gkkmfvstgk kynfekgksl cakagsvlas prneaental
181 kdlidpssqa yigisdaqte grfmylsggp ltysnwkpge pnnhknedca viedsgkwnd
241 ldcsnsnifi icel

SEQ ID NO: 26
LNMSMC mannose-binding lectin C precursor – mouse
gi|7428747|pir||LNMSMC[7428747]

FEATURES Location/Qualifiers source 1..244 /organism="Mus musculus"
/db_xref="taxon:10090"
Protein 1..244 /product="mannose-binding lectin C precursor" /note="Ra-reactive factor P28a"
Region 1..18 /region_name="domain" /note="signal sequence"
Region 19..244 /region_name="product" /note="mannose-binding lectin C"
Bond bond(29) /bond_type="disulfide" /note="interchain"
Bond bond(34) /bond_type="disulfide" /note="interchain"
Region 38..94 /region_name="region" /note="collagen-like"
Site 69 /site_type="modified" /note="4-hydroxyproline (Pro)"
Region 124..240 /region_name="domain" /note="C-type lectin homology #label LCH"
ORIGIN 1 msiftsflll cvvtvvyaet ltegvqnscp vvtcsspgln gfpgkdgrdg akgekgepgq
61 glrglqgppg kvgptgppgn pglkgavgpk gdrgdraefd tseidseiaa lrselralrn
121 wvlfslsekv gkkyfvssvk kmsldrvkal csefqgsvat prnaeensai qkvakdiayl
181 gitdvrvegs fedltgnrvr ytnwndgepn ntgdgedcvv ilgngkwndv pcsdsflaic
241 efsd

SEQ ID NO:27
LNMSMA mannose-binding lectin A precursor – mouse
gi|625320|pir||LNMSMA[625320]

FEATURES Location/Qualifiers source 1..239 /organism="Mus musculus"
/db_xref="taxon:10090"
Protein 1..239 /product="mannose-binding lectin A precursor" /note="Ra-reactive factor P28b; serum mannan-binding protein"
Region 1..17 /region_name="domain" /note="signal sequence"
Region 18..238 /region_name="product" /note="mannose-binding lectin A"
Region 36..88 /region_name="region" /note="collagen-like"
Region 119..235 /region_name="domain" /note="C-type lectin homology #label LCH"
ORIGIN 1 mlllpllpvl lcvvsvsssg sqtcedtlkt csviacgrdg rdgpkgekge pgqglrglqg
61 ppgklgppgs vgspgspgpk gqkgdhgdnr aieeklanme aeirilkskl qltnklhafs
121 mgkksgkklf vtnhekmpfs kvkslctelq gtvaiprnae enkaiqevat giaflgitde
181 ategqfmyvt ggrltysnwk kdepnnhgsg edcviildng lwndiscqas fkavcefpa

SEQ ID NO: 28
LNRTMA mannose-binding lectin A precursor – rat gi|71975|pir||LNRTMA[71975]

FEATURES Location/Qualifiers source 1..238 /organism="Rattus norvegicus"
/db_xref="taxon:10116"

Protein 1..238 /product="mannose-binding lectin A precursor" /note="serum mannan-binding protein"
Region 1..17 /region_name="domain" /note="signal sequence"
Region 18..238 /region_name="product" /note="mannose-binding lectin A"
Region 36..88 /region_name="region" /note="collagen-like"
Site 61 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 67 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 73 /site_type="modified" /note="4-hydroxyproline (Pro)"
Site 79 /site_type="modified" /note="lysine derivative (Lys) (probably 5-hydroxylysine)"
Site 82 /site_type="modified" /note="lysine derivative (Lys) (probably 5-hydroxylysine)"
Region 85..87 /region_name="region" /note="cell attachment (R-G-D) motif"
Region 118..234 /region_name="domain" /note="C-type lectin homology #label LCH"

ORIGIN 1 mlllpllvll cvvsvssgs qtceetlktc sviacgrdgr dgpkgekgep gqglrglqgp
61 pgklgppgsv gapgsqgpkg qkgdrgdsra ievklanmea eintlkskle ltnklhafsm
121 gkksgkkffv tnhermpfsk vkalcselrg tvaiprnaee nkaiqevakt saflgitdev
181 tegqfmyvtg grltysnwkk depndhgsge dcvtivdngl wndiscqash tavcefpa

SEQ ID NO: 29
LNRTMC mannose-binding lectin C precursor – rat gi|71974|pir||LNRTMC[71974]
FEATURES Location/Qualifiers source 1..244 /organism="Rattus norvegicus" /db_xref="taxon:10116"
Protein 1..244 /product="mannose-binding lectin C precursor"
Region 1..18 /region_name="domain" /note="signal sequence"
Region 19..244 /region_name="product" /note="mannose-binding lectin C"
Bond bond(29) /bond_type="disulfide" /note="interchain"
Bond bond(34) /bond_type="disulfide" /note="interchain"
Region 38..94 /region_name="region" /note="collagen-like"
Site 69 /site_type="modified" /note="4-hydroxyproline (Pro)"
Region 124..240 /region_name="domain" /note="C-type lectin homology #label LCH"
ORIGIN 1 mslftsflll cvltavyaet ltegaqsscp viacsspgln gfpgkdghdg akgekgepgq
61 glrglqgppg kvgpagppgn pgskgatgpk gdrgesvefd ttnidleiaa lrselramrk
121 wvllsmsenv gkkyfmssvr rmplnrakal cselqgtvat prnaeenrai qnvakdvafl
181 gitdqrtenv fedltgnrvr ytnwnegepn nvgsgencvv lltngkwndv pcsdsflvvc
241 efsd

SEQ ID NO: 30
LNHUMC mannose-binding lectin precursor – human gi|71973|pir||LNHUMC[71973]
FEATURES Location/Qualifiers source 1..248 /organism="Homo sapiens" /db_xref="taxon:9606"
Protein 1..248 /product="mannose-binding lectin precursor" /note="mannan-binding protein"
Region 1..20 /region_name="domain" /note="signal sequence"
Region 21..248 /region_name="product" /note="mannose-binding lectin"
Region 42..99 /region_name="region" /note="collagen-like"
Site 47 /site_type="modified" /note="4-hydroxyproline (Pro) (partial)"
Site 73 /site_type="modified" /note="4-hydroxyproline (Pro) (partial)"
Site 79 /site_type="modified" /note="4-hydroxyproline (Pro) (partial)"
Site 82 /site_type="modified" /note="4-hydroxyproline (Pro) (partial)"

Site 88 /site_type="modified" /note="4-hydroxyproline (Pro) (partial)"
Region 128..244 /region_name="domain" /note="C-type lectin homology #label LCH"
ORIGIN 1 mslfpslpll llsmvaasys etvtcedaqk tcpaviacss pgingfpgkd grdgtkgekg
61 epgqglrglq gppgklgppg npgpsgspgp kgqkgdpgks pdgdsslaas erkalqtema
121 rikkwltfsl gkqvgnkffl tngeimtfek vkalcvkfqa svatprnaae ngaiqnlike
181 eaflgitdek tegqfvdltg nrltytnwne gepnnagsde dcvlllkngq wndvpcstsh
241 lavcefpi

SEQ ID NO: 31
BAA86864 complement C1s [Homo sapiens] gi|6407558|dbj|BAA86864.1|[6407558]

FEATURES Location/Qualifiers source 1..329 /organism="Homo sapiens" /db_xref="taxon:9606" /tissue_type="peripheral leukocytes" /clone_lib="FIXII"
Protein 1..329 /product="complement C1s"
CDS 1..329 /coded_by="join(AB009076.1:1142..1146, AB009076.1:1703..1910,AB009076.1:2118..2295, AB009076.1:3495..3620,AB009076.1:4328..4527, AB009076.1:5047..5200,AB009076.1:5748..>5863)" /note="This gene consists of total 12 exons, the last 4 exons of which were reported by Toshi,M. et al.(J.Mol.Biol. 208:709-714, 1989)
ORIGIN 1 mwcivlfsll awvyaeptmy geilspnypq aypseveksw dievpegygi hlyfthldie
61 lsencaydsv qiisgdteeg rlcgqrssnn phspiveefq vpynklqvif ksdfsneerf
121 tgfaayyvat dinectdfvd vpcshfcnnf iggyfcscpp eyflhddmkn cgvncsgdvf
181 taligeiasp nypkpypens rceyqirlek gfqvvvtlrr edfdveaads agncldslvf
241 vagdrqfgpy cghgfpgpln ietksnaldi ifqtdltgqk kgwklryhgd pmpcpkedtp
301 nsvwepakak yvfrdvvqit cldgfevve

SEQ ID NO: 32
CAB56124 mannose-binding lectin [Homo sapiens]
gi|5911809|emb|CAB56124.1|[5911809]

FEATURES Location/Qualifiers source 1..248 /organism="Homo sapiens" /db_xref="taxon:9606" /chromosome="10" /map="10q11.2-q21" /note="MBL haplotype HYPD"
Protein 1..248 /product="mannose-binding lectin"
sig_peptide 1..20
CDS 1..248 /gene="MBL" /coded_by="Y16582.1:892..1638"
ORIGIN 1 mslfpslpll llsmvaasys etvtcedaqk tcpaviacss pgingfpgkd gcdgtkgekg
61 epgqglrglq gppgklgppg npgpsgspgp kgqkgdpgks pdgdsslaas erkalqtema
121 rikkwltfsl gkqvgnkffl tngeimtfek vkalcvkfqa svatprnaae ngaiqnlike
181 eaflgitdek tegqfvdltg nrltytnwne gepnnagsde dcvlllkngq wndvpcstsh
241 lavcefpi

SEQ ID NO: 33
CAB56123 mannose-binding lectin [Homo sapiens]
gi|5911807|emb|CAB56123.1|[5911807]

FEATURES Location/Qualifiers source 1..248 /organism="Homo sapiens" /db_xref="taxon:9606" /chromosome="10" /map="10q11.2-q21" /note="MBL haplotype HYPA"
Protein 1..248 /product="mannose-binding lectin"
sig_peptide 1..20

CDS 1..248 /gene="MBL" /coded_by="Y16581.1:892..1638"
ORIGIN 1 mslfpslpll llsmvaasys etvtcedaqk tcpaviacss pgingfpgkd grdgtkgekg
61 epgqglrglq gppgklgppg npgpsgspgp kgqkgdpgks pdgdsslaas erkalqtema
121 rikkwltfsl gkqvgnkffl tngeimtfek vkalcvkfqa svatprnaae ngaiqnlike
181 eaflgitdek tegqfvdltg nrltytnwne gepnnagsde dcvlllkngq wndvpcstsh
241 lavcefpi

SEQ ID NO: 34
CAB56122 mannose-binding lectin [Homo sapiens]
gi|5911798|emb|CAB56122.1|[5911798]

FEATURES Location/Qualifiers source 1..248 /organism="Homo sapiens"
/db_xref="taxon:9606" /chromosome="10" /map="10q11.2-q21" /note="MBL
haplotype LXPA"
Protein 1..248 /product="mannose-binding lectin"
sig_peptide 1..20
CDS 1..248 /gene="MBL" /coded_by="Y16580.1:892..1638"
ORIGIN 1 mslfpslpll llsmvaasys etvtcedaqk tcpaviacss pgingfpgkd grdgtkgekg
61 epgqglrglq gppgklgppg npgpsgspgp kgqkgdpgks pdgdsslaas erkalqtema
121 rikkwltfsl gkqvgnkffl tngeimtfek vkalcvkfqa svatprnaae ngaiqnlike
181 eaflgitdek tegqfvdltg nrltytnwne gepnnagsde dcvlllkngq wndvpcstsh
241 lavcefpi

SEQ ID NO: 35
CAB56121 mannose-binding lectin [Homo sapiens]
gi|5911796|emb|CAB56121.1|[5911796]

FEATURES Location/Qualifiers source 1..248 /organism="Homo sapiens"
/db_xref="taxon:9606" /chromosome="10" /map="10q11.2-q21" /note="MBL
haplotype LYPB"
Protein 1..248 /product="mannose-binding lectin"
sig_peptide 1..20
CDS 1..248 /gene="MBL" /coded_by="Y16579.1:892..1638"
ORIGIN 1 mslfpslpll llsmvaasys etvtcedaqk tcpaviacss pgingfpgkd grddtkgekg
61 epgqglrglq gppgklgppg npgpsgspgp kgqkgdpgks pdgdsslaas erkalqtema
121 rikkwltfsl gkqvgnkffl tngeimtfek vkalcvkfqa svatprnaae ngaiqnlike
181 eaflgitdek tegqfvdltg nrltytnwne gepnnagsde dcvlllkngq wndvpcstsh
241 lavcefpi

SEQ ID NO: 36
CAB56045 mannose-binding lectin [Homo sapiens]
gi|5911794|emb|CAB56045.1|[5911794]

/organism="Homo sapiens" /db_xref="taxon:9606" /chromosome="10"
/map="10q11.2-q21" /note="MBL haplotype LYQC"
Protein 1..248 /product="mannose-binding lectin"
sig_peptide 1..20
CDS 1..248 /gene="MBL" /coded_by="Y16578.1:886..1632"
ORIGIN 1 mslfpslpll llsmvaasys etvtcedaqk tcpaviacss pgingfpgkd grdgtkeekg
61 epgqglrglq gppgklgppg npgpsgspgp kgqkgdpgks pdgdsslaas erkalqtema
121 rikkwltfsl gkqvgnkffl tngeimtfek vkalcvkfqa svatprnaae ngaiqnlike
181 eaflgitdek tegqfvdltg nrltytnwne gepnnagsde dcvlllkngq wndvpcstsh
241 lavcefpi

SEQ ID NO: 37
CAB56120 mannose-binding lectin [Homo sapiens]
gi|5911792|emb|CAB56120.1|[5911792]
FEATURES Location/Qualifiers source 1..248 /organism="Homo sapiens"
/db_xref="taxon:9606" /chromosome="10" /map="10q11.2-q21" /note="MBL haplotype LYPA"
Protein 1..248 /product="mannose-binding lectin"
sig_peptide 1..20
CDS 1..248 /gene="MBL" /coded_by="Y16577.1:892..1638"
ORIGIN 1 mslfpslpll llsmvaasys etvtcedaqk tcpaviacss pgingfpgkd grdgtkgekg
61 epgqglrglq gppgklgppg npgpsgspgp kgqkgdpgks pdgdsslaas erkalqtema
121 rikkwltfsl gkqvgnkffl tngeimtfek vkalcvkfqa svatprnaae ngaiqnlike
181 eaflgitdek tegqfvdltg nrltytnwne gepnnagsde dcvlllkngq wndvpcstsh
241 lavcefpi

SEQ ID NO: 38
CAB56044 mannose-binding lectin [Homo sapiens]
gi|5911790|emb|CAB56044.1|[5911790]
FEATURES Location/Qualifiers source 1..248 /organism="Homo sapiens"
/db_xref="taxon:9606" /chromosome="10" /map="10q11.2-q21" /note="MBL haplotype LYQA"
Protein 1..248 /product="mannose-binding lectin"
sig_peptide 1..20
CDS 1..248 /gene="MBL" /coded_by="Y16576.1:886..1632"
ORIGIN 1 mslfpslpll llsmvaasys etvtcedaqk tcpaviacss pgingfpgkd grdgtkgekg
61 epgqglrglq gppgklgppg npgpsgspgp kgqkgdpgks pdgdsslaas erkalqtema
121 rikkwltfsl gkqvgnkffl tngeimtfek vkalcvkfqa svatprnaae ngaiqnlike
181 eaflgitdek tegqfvdltg nrltytnwne gepnnagsde dcvlllkngq wndvpcstsh
241 lavcefpi

SEQ ID NO: 39
AAB53110 C1qR(p) [Homo sapiens] gi|2052498|gb|AAB53110.1|[2052498]

FEATURES Location/Qualifiers source 1..652 /organism="Homo sapiens"
/db_xref="taxon:9606" /cell_line="U937 histiocytic cell line"
Protein 1..652 /product="C1qR(p)" /function="mediates enhanced phagocytosis by human monocytes and macrophages in response to complement C1q, mannose binding lectin (MBL) and pulmonary surfactant protein A (SPA)"
CDS 1..652 /coded_by="U94333.1:149..2107" /note="Clq/MBL/SPA receptor"
ORIGIN 1 matsmglll llllltqpga gtgadteavv cvgtacytah sgklsaaeaq nhcnqnggnl
61 atvkskeeaq hvqrvlaqll rreaaltarm skfwiglqre kgkcldpslp lkgfswvggg
121 edtpysnwhk elrnsciskr cvslldlsq pllpnrlpkw segpcgspgs pgsniegfvc
181 kfsfkgmcrp lalggpgqvt yttpfqttss sleavpfasa arvacgegdk detqshyflc
241 kekapdvfdw gssgplcvsp kygcnfnngg chqdcfeggd gsflcgcrpg frlldlvtc
301 asrnpcsssp crggatcvlg phgknytcrc pqgyqldssq ldcvdvdecq dspcaqecvn
361 tpggfrcecw vgyepggpge gacqdvdeca lgrspcaqgc tntdgsfhcs ceegyvlage
421 dgtqcqdvde cvgpggplcd slcfntqgsf hcgclpgwvl apngvsctmg pvslgppsgp
481 pdeedkgeke gstvpraata sptrgpegtp katpttsrps lssdapitsa plkmlapsgs
541 sgvwrepsih hataasgpqe paggdssvat qnndgtdgqk lllfyilgtv vaillllala
601 lgllvyrkrr akreekkekk pqnaadsysw vperaesram enqysptpgt dc

SEQ ID NO: 40

NP_571645 mannose binding-like lectin [Danio rerio]
gi|18858997|ref|NP_571645.1|[18858997]

sig_peptide 1..23
mat_peptide 24..251 /product="mannose binding-like lectin"
Region 24..36 /region_name="N-terminal segment"
Region 33..70 /region_name="Collagen triple helix repeat (20 copies)"
/note="Collagen" /db_xref="CDD:pfam01391"
Region 33..70 /region_name="Collagen triple helix repeat (20 copies)"
/note="Collagen" /db_xref="CDD:pfam01391"
Region 37..101 /region_name="collagen-like structure"
Region 37..70 /region_name="Collagen triple helix repeat (20 copies)"
/note="Collagen" /db_xref="CDD:pfam01391"
Region 71..74 /region_name="break in collagen structure"
Region 102..132 /region_name="neck region"
Region 133..251 /region_name="carbohydrate recognition domain" /note="CRD"
Region 134..247 /region_name="C-type lectin (CTL) or carbohydrate-recognition
domain (CRD)" /note="CLECT" /db_xref="CDD:smart00034"
Region 146..247 /region_name="Lectin C-type domain" /note="lectin_c"
/db_xref="CDD:pfam00059"
CDS 1..251 /gene="mbl" /coded_by="NM_131570.1:68..823" /note="collectin with
structural homology to mannose-binding lectin but with a predicted carbohydrate
specificity for galactose;mannose binding-like lectin" /db_xref="LocusID:58091"
ORIGIN 1 mallklflga llllqlvlql magaadpqsl ncpayagvpg tpghnglpgr dgrvgrdgan
61 gpkgekgepg vnvqgppgka gppgpagakg ergpsglpgq dcmsdslkse lqklsdkial
121 iekvvnfktf kkvgqkyyvt ddveetfdkg mqycssngga lvlprtleen allkvfvssa
181 fkrlfiritd rekegefvdt drkkltftnw gpnqpdnykg aqdcgaiads glwddvscds
241 lypiiceiei k

SEQ ID NO: 41
BAA90338 mannose-binding lectin-associated serine protease (MASP) related
protein [Cyprinus carpio] gi|6807499|dbj|BAA90338.1|[6807499]
FEATURES Location/Qualifiers source 1..118 /organism="Cyprinus carpio"
/db_xref="taxon:7962"
Protein 1..118 /product="mannose-binding lectin-associated serine protease
(MASP) related protein"
CDS 1..118 /gene="MRPb"
/coded_by="join(AB030447.1:<1..96,AB030447.1:201..319,
AB030447.1:436..514,AB030447.1:616..680)" /note="MASP-related protein"
ORIGIN 1 kiqtgsntvs ilfhsdnsgd nlgwkltyts tgsecsplaa plnghleplq snyifkdhim
61 ltcdpgyslr qgdkefehyq iecqrdgkws sdvplckkke sqrrhrslps iltnqils

The second polypeptide preferably comprises at least 10, such as at least 12, for example at least 15, such as at least 20, for example at least 25, such as at least 30, for example at least 35, such as at least 40, for example at least 50 consecutive amino acid residues of the collectin or of a variant or a homologue to said protein. Such a variant or homologue is preferably at least 70%, such as 80%, for example 90%, such as 95% identical to the collectin.

In a preferred embodiment the second polypeptide sequence comprises the CRD domain of MBL or the neck region of MBL or the collagen-like domain of MBL. More preferably the second polypeptide comprises the neck region and the CRD domain of MBL. In a most preferred embodiment the second polypeptide sequence comprises the collagen-like domain, the neck region and the CRD domain of MBL. MBL is as defined above.

Preferably the second polypeptide sequence comprises at least amino acids 170-200 of the MBL sequence shown in Figure 2, such as at least amino acids 160-200 of the MBL sequence shown in Figure 2, such as at least amino acids 150-200 of the MBL sequence shown in Figure 2, such as at least amino acids 140-200 of the MBL sequence shown in Figure 2, such as at least amino acids 130-200 of the MBL sequence shown in Figure 2, such as at least amino acids 120-200 of the MBL sequence shown in Figure 2, such as at least amino acids 110-200 of the MBL sequence shown in Figure 2, such as at least amino acids 100-200 of the MBL sequence shown in Figure 2, such as at least amino acids 90-200 of the MBL sequence shown in Figure 2, such as at least amino acids 80-200 of the MBL sequence shown in Figure 2, such as at least amino acids 70-200 of the MBL sequence shown in Figure 2, such as at least amino acids 60-200 of the MBL sequence shown in Figure 2, such as at least amino acids 80-228 of the MBL sequence shown in Figure 2.

Preferably the second polypeptide sequence comprises amino acids 80-228 of SEQ ID. NO 2.

In a preferred embodiment the second polypeptide sequence is capable of associating with at least one MASP protein, such as a MASP protein selected from the group consisting of MASP-1, MASP-2 and MASP-3 or functional homologues or variants hereof. In particular the second polypeptide is capable of associating with said at least one MASP protein when being part of the fusion protein. Thereby the second polypeptide sequence is capable of providing the fusion protein with complement system activating activity. In a preferred embodiment the second polypeptide sequence comprises an amino acid sequence selected from: 56-228 of SEQ ID. NO 2, 55-228 of SEQ ID. NO 2, 54-228 of SEQ ID. NO 2, and 50-228 of SEQ ID.

NO 2. In a preferred embodiment the second polypeptide sequence has an amino acid sequence selected from: 56-228 of SEQ ID. NO 2, 55-228 of SEQ ID. NO 2, 54-228 of SEQ ID. NO 2, and 50-228 of SEQ ID. NO 2.

In another embodiment the second polypeptide comprises the cysteine-rich region of the collectin, such as the N-terminal region of the collectin.

Fusion protein

The fusion protein comprises the first and the second polypeptide connected to each other, optionally through a linker region. In a preferred embodiment the first polypeptide sequence is positioned N-terminally in the fusion protein and the second polypeptide sequence is positioned C-terminally.

Specific examples of the components of the fusion protein are:

- A fusion protein comprising the cysteine-rich region and the collagen-like domain of L-ficolin and the CRD domain of MBL.

- A fusion protein comprising the cysteine-rich region of L-ficolin and the collagen-like domain, the neck region and the CRD domain of MBL.

- A fusion protein comprising the cysteine-rich region and the collagen-like domain of H-ficolin and the CRD domain of MBL.

- A fusion protein comprising the cysteine-rich region of H-ficolin and the collagen-like domain, the neck region and the CRD domain of MBL.

- A fusion protein comprising the cysteine-rich region and the collagen-like domain of M-ficolin and the CRD domain of MBL.

- A fusion protein comprising the cysteine-rich region of M-ficolin and the collagen-like domain, the neck region and the CRD domain of MBL.

- A fusion protein comprising the cysteine-rich region of MBL, and the CRD domain of ficolin.

- A fusion protein comprising the cysteine-rich region of MBL and the collagen-like domain, the neck region and the CRD domain of ficolin.

- A fusion protein comprising the cysteine-rich region and the collagen-like domain of L-ficolin and the CRD domain of Pulmonary surfactant-associated protein D.

- A fusion protein comprising the cysteine-rich region of L-ficolin and the collagen-like domain, the neck region and the CRD domain of Pulmonary surfactant-associated protein D.

- A fusion protein comprising the cysteine-rich region and the collagen-like domain of a ficolin and the CRD domain of a collectin-43.

- A fusion protein comprising the cysteine-rich region of a ficolin and the collagen-like domain, the neck region and the CRD domain of a collectin-43.

A fusion protein comprising the amino acid sequence as defined by the sequence shown in Figure 3, or a functional homologue thereof, preferably a fusion protein consisting of the amino acid sequence as shown in Figure 3. In another embodiment the fusion protein has amino acid sequence 1-50 of the amino acid shown in Figure 1 and amino acid sequence 54-228 of the amino acid sequence shown in Figure 2.

As discussed above the fusion protein is preferably capable of forming subunit complexes as well as oligomers of subunit complexes. Preferably the fusion protein forms substantially only trimeric, tetrameric, pentameric and hexameric subunit oligomers, such as trimeric, tetrameric, and pentameric subunit oligomers, such as trimeric or tetrameric subunit oligomers, more preferably substantially only tetrameric subunit oligomers, in order to obtain a more homogenous composition of fusion proteins.

Homologues

In the present context the terms homologue or variant or functional homologues are used as synonymes, wherein a homologue of a protein exhibits one or more substituions, deletions, and/or additions of one or more amino acid residues. Fragments are a subgroup of homologues being truncations of the protein.

A homologue of the protein may comprise one or more conservative amino acid substitutions, such as at least 2 conservative amino acid substitutions, for example at least 3 conservative amino acid substitutions, such as at least 5 conservative amino acid substitutions, for example at least 10 conservative amino acid substitutions, such as at least 20 conservative amino acid substitutions, for example at least 50 conservative amino acid substitutions such as at least 75 conservative amino acid substitutions, for example at least 100 conservative amino acid substitutions. Conservative amino acid substitutions within the meaning of the present invention is substitution of one amino acid within a predetermined group of amino acids for another amino acid within the same predetermined group, exhibiting similar or substantially similar characteristics. Such predetermined groups are for example:

polar side chains (Asp, Glu, Lys, Arg, His, Asn, Gln, Ser, Thr, Tyr, and Cys,)

non-polar side chains (Gly, Ala, Val, Leu, Ile, Phe, Trp, Pro, and Met)

aliphatic side chains (Gly, Ala Val, Leu, Ile)

cyclic side chains (Phe, Tyr, Trp, His, Pro)

aromatic side chains (Phe, Tyr, Trp)

acidic side chains (Asp, Glu)

basic side chains (Lys, Arg, His)

amide side chains (Asn, Gln)

hydroxy side chains (Ser, Thr)

sulphor-containing side chains (Cys, Met), and

amino acids being monoamino-dicarboxylic acids or monoamino-monocarboxylic-monoamidocarboxylic acids (Asp, Glu, Asn, Gln).

Conservative substitutions may be introduced in any position of a preferred protein. It may however also be desirable to introduce non-conservative substitutions. A non-conservative substitution should lead to the formation of a homologue of a protein capable of exerting a function similar to the function of said protein. Such substitution could for example i) differ substantially in hydrophobicity, for example a hydrophobic residue (Val, Ile, Leu, Phe or Met) substituted for a hydrophilic residue such as Arg, Lys, Trp or Asn, or a hydrophilic residue such as Thr, Ser, His, Gln, Asn, Lys, Asp, Glu or Trp substituted for a hydrophobic residue; and/or ii) differ substantially in its effect on polypeptide backbone orientation such as substitution of or for Pro or Gly by another residue; and/or iii) differ substantially in electric charge, for example substitution of a negatively charged residue such as Glu or Asp for a positively charged residue such as Lys, His or Arg (and vice versa); and/or iv) differ substantially in steric bulk, for example substitution of a bulky residue such as His, Trp, Phe or Tyr for one having a minor side chain, e.g. Ala, Gly or Ser (and vice versa).

In a further embodiment the present invention relates to homologues of a preferred protein, wherein such homologues comprise substituted amino acids having hydrophilic or hydropathic indices that are within +/-2.5, for example within +/- 2.3, such as within +/- 2.1, for example within +/- 2.0, such as within +/- 1.8, for example within +/- 1.6, such as within +/- 1.5, for example within +/- 1.4, such as within +/- 1.3 for example within +/- 1.2, such as within +/- 1.1, for example within +/- 1.0, such as within +/- 0.9, for example within +/- 0.8, such as within +/- 0.7, for example within +/- 0.6, such as within +/- 0.5, for example within +/- 0.4, such as within +/- 0.3, for example within +/- 0.25, such as within +/- 0.2 of the value of the amino acid it has substituted.

The importance of the hydrophilic and hydropathic amino acid indices in conferring interactive biologic function on a protein is well understood in the art (Kyte & Doolittle, 1982 and Hopp, U.S. Pat. No. 4,554,101, each incorporated herein by reference).

The amino acid hydropathic index values as used herein are: isoleucine (+4.5); valine (+4.2); leucine (+3.8); phenylalanine (+2.8); cysteine/cystine (+2.5); methionine (+1.9); alanine (+1.8); glycine (-0.4); threonine (-0.7); serine (-0.8); tryptophan (-0.9); tyrosine (-1.3); proline (-1.6); histidine (-3.2); glutamate (-3.5); glutamine (-3.5); aspartate (-3.5); asparagine (-3.5); lysine (-3.9); and arginine (-4.5) (Kyte & Doolittle, 1982).

The amino acid hydrophilicity values are: arginine (+3.0); lysine (+3.0); aspartate (+3.0.+-.1); glutamate (+3.0.+-.1); serine (+0.3); asparagine (+0.2); glutamine (+0.2); glycine (0); threonine (-0.4); proline (-0.5.+-.1); alanine (-0.5); histidine (-0.5); cysteine (-1.0); methionine (-1.3); valine (-1.5); leucine (-1.8); isoleucine (-1.8); tyrosine (-2.3); phenylalanine (-2.5); tryptophan (-3.4) (U.S. 4,554,101).

Substitution of amino acids can therefore in one embodiment be made based upon their hydrophobicity and hydrophilicity values and the relative similarity of the amino acid side-chain substituents, including charge, size, and the like. Exemplary amino acid substitutions which take various of the foregoing characteristics into consideration are well known to those of skill in the art and include: arginine and lysine; glutamate and aspartate; serine and threonine; glutamine and asparagine; and valine, leucine and isoleucine.

Furthermore, a homologue may comprise addition or deletion of an amino acid, for example an addition or deletion of from 2 to 100 amino acids, such as from 2 to 50 amino acids, for example from 2 to 20 amino acids, such as from 2 to 10 amino acids, for example from 2 to 5 amino acids, such as from 2 to 3 amino acids. However, additions of more than 100 amino acids, such as additions from 100 to 500 amino acids, are also comprised within the present invention.

Proteins sharing at least some homology with a preferred protein are to be considered as falling within the scope of the present invention when they are at least about

40 percent homologous, or preferably identical, with the preferred protein, such as at least about 50 percent homologous, or preferably identical, for example at least about 60 percent homologous, or preferably identical, such as at least about 70 percent homologous, or preferably identical, for example at least about 75 percent homologous, or preferably identical, such as at least about 80 percent homologous, or preferably identical, for example at least about 85 percent homologous, or preferably identical, such as at least about 90 percent homologous, or preferably identical, for example at least 92 percent homologous, or preferably identical, such as at least 94 percent homologous, or preferably identical, for example at least 95 percent homologous, or preferably identical, such as at least 96 percent homologous, or preferably identical, for example at least 97 percent homologous, s or preferably identical, uch as at least 98 percent homologous, or preferably identical, for example at least 99 percent homologous, or preferably identical, with the preferred protein.

Preferred proteins are complement activating proteins comprising collectins and lectins and homologues hereof.

Homologues of collectins

A homologue of a collectin including MBL within the scope of the present invention should be understood as any protein capable of exerting a function similar to the function of a collectin and comprising one or more of the variations described above. In particular such function is the ability to activate complement upon binding to one or more carbohydrates.

The terms functional homologues of collectin used herein relate to functional equivalents or a fragment of collectin comprising a predetermined amino acid sequence, and such homologues are defined as:

a) A homologue comprising an amino acid sequence capable of recognising and binding to glucans, lipophosphoglycans and glycoinositol phospholipids that contain sugar with 3- and 4-hydroxyl groups in the pyranose ring (i.e. Man, Glc, Fuc or GlcNAc) either alone or when being subunit complexed as described above and/or

b) A homologue comprising an amino acid sequence capable of forming an association with a component of the Lectin/MBL pathway such as binding to the MASP-1, MASP-2, MASP-3 and/or sMAP either alone or when being subunit complexed as described above, wherein said binding result in activation of the Lectin/MBL pathway and/or

c) A homologue comprising an amino acid sequence capable of by the collagen-like domain forming an oligomeric structure of two or more subunits, where a subunit comprises three identical polypeptides of a cysteine-rich region, a collagen-like domain, a neck region and a carbohydrate recognition domain.

Homoloques of lectins

A homologue of a lectin including ficolins within the scope of the present invention should be understood as any protein capable of exerting a function similar to the function of a lectin and comprising one or more of the variations previously described. In particular such function is the ability to activate complement upon binding to one or more carbohydrates.

The terms functional homologues of lectin used herein relate to functional equivalents of a fragment of lectin comprising a predetermined amino acid sequence, and such homologues are defined as:

a) A homologue comprising an amino acid sequence capable of recognising and binding to N-acetyl-glucosamine (GlcNAc), or N-acetyl-galactosamine (GalNAc), or elastin either alone or when being subunit complexed as described above and/or

b) A homologue comprising an amino acid sequence capable of forming an association with a component of the Lectin/MBL pathway such as binding to the MASP-1, MASP-2, MASP-3 and/or sMAP either alone or when being subunit complexed as described above, wherein said binding result in activation of the Lectin/MBL pathway and/or

c) A homologue comprising an amino acid sequence capable of by the collagen-like domain forming an oligomeric structure of two or more subunits, where a subunit comprises three identical polypeptides of a cysteine-rich region, a collagen-like domain, a neck region and a fibrinogen-like domain.

The activation of the lectin/MBL pathway, i.e. the activity of the fusion protein to activate the complement system may be assessed by assessing the C4 cleaving effect of the fusion protein or subunit complexes or oligomers of complexes thereof by the following method comprising the steps of

- applying a sample comprising a predetermined amount of fusion protein as well as a predetermined amount of MASP-1, MASP-2 or MASP-3,

- applying at least one complement factor to the sample,

- detecting the amount of cleaved complement factors,

- correlating the amount of cleaved complement factors to the amount of fusion protein , and

- determining the activity of the fusion protein.

The complement factor preferably used in the present method is a complement factor cleavable by the MBL/MASP-2 complex, such as C4. However, the complement factor may also be selected from C3 and C5.

The cleaved complement factor may be detected by a variety of means, such as by of antibodies directed to the cleaved complement factor.

The assay is carried out at conditions which minimize or eliminate interference from the classical complement activation pathway and the alternative complement activation pathway.

Preferably a homologue of a collectin and/or a lectin exhibits two of the functions defined above, more preferably three of the functions defined above.

Preparation of fusion protein

The fusion protein may be prepared by any suitable method known to the person skilled in the art. Below are described several of the methods for preparing the fusion protein, however the invention is not limited to those methods.

Synthetic preparation

When appropriate, in particular in relation to the size of the fusion protein, the fusion protein may be produced synthetically. The methods for synthetic production of peptides are well known in art. Detailed descriptions as well as practical advice for producing synthetic peptides may be found in Synthetic Peptides: A User's Guide (Advances in Molecular Biology), Grant G. A. ed., Oxford University Press, 2002, or in: Pharmaceutical Formulation: Development of Peptides and Proteins, Frokjaer and Hovgaard eds., Taylor and Francis, 1999.

Recombinant preparation

The fusion proteins of the invention are preferably produced by use of recombinant DNA technologies. The DNA sequence encoding each part of the fusion protein may be prepared by fragmentation of the DNA sequences encoding the full-length protein, (genomic DNA or cDNA) which the fusion protein part is derived from, using DNAase I according to a standard protocol (Sambrook et al., Molecular cloning: A Laboratory manual. 2 rd ed., CSHL Press, Cold Spring Harbor, NY, 1989). The obtained DNA sequences encoding the individual parts of the fusion protein may then be fused together.

The DNA sequence may also be prepared by polymerase chain reaction using specific primers, for instance as described in US 4,683,202 or Saiki et al., 1988, Science 239:487-491.

The DNA sequence encoding a fusion protein of the invention may be prepared synthetically by established standard methods, e.g. the phosphoamidine method described by Beaucage and Caruthers, 1981, Tetrahedron Lett. 22:1859-1869, or the method described by Matthes et al., 1984, EMBO J. 3:801-805. According to the phosphoamidine method, oligonucleotides are synthesized, e.g. in an automatic DNA synthesizer, purified, annealed, ligated and cloned in suitable vectors.

The DNA sequence is then inserted into a recombinant expression vector, which may be any vector, which may conveniently be subjected to recombinant DNA procedures. The choice of vector will often depend on the host cell into which it is to be introduced. Thus, the vector may be an autonomously replicating vector, i.e. a vector that exists as an extrachromosomal entity, the replication of which is independent of chromosomal replication, e.g. a plasmid. Alternatively, the vector may be one which, when introduced into a host cell, is integrated into the host cell genome and replicated together with the chromosome(s) into which it has been integrated.

In the vector, the DNA sequence encoding a fusion protein should be operably connected to a suitable promoter sequence. The promoter may be any DNA sequence, which shows transcriptional activity in the host cell of choice and may be derived from genes encoding proteins either homologous or heterologous to the host cell. Examples of suitable promoters for directing the transcription of the coding DNA sequence in mammalian cells are the SV 40 promoter (Subramani et al., 1981, Mol. Cell Biol. 1:854-864), the MT-1 (metallothionein gene) promoter (Palmiter et al., 1983, Science 222: 809-814) or the adenovirus 2 major late promoter. A suitable promoter for use in insect cells is the polyhedrin promoter (Vasuvedan et al., 1992, FEBS Lett. 311:7-11). Suitable promoters for use in yeast host cells include promoters from yeast glycolytic genes (Hitzeman et al., 1980, J. Biol. Chem. 255:12073-12080; Alber and Kawasaki, 1982, J. Mol. Appl. Gen. 1: 419-434) or alcohol dehydrogenase genes (Young et al., 1982, in Genetic Engineering of Microorganisms for Chemicals, Hollaender et al, eds., Plenum Press, New York), or the TPI1 (US 4,599,311) or ADH2-4c (Russell et al., 1983, Nature 304:652-654) promoters. Suitable promoters for use in filamentous fungus host cells are, for instance, the ADH3 promoter (McKnight et al., 1985, EMBO J. 4:2093-2099) or the tpiA promoter.

The coding DNA sequence may also be operably connected to a suitable terminator, such as the human growth hormone terminator (Palmiter et al., op. cit.) or (for fungal hosts) the TPI1 (Alber and Kawasaki, op. cit.) or ADH3 (McKnight et al., op. cit.) promoters. The vector may further comprise elements such as polyadenylation signals (e.g. from SV 40 or the adenovirus 5 Elb region), transcriptional enhancer sequences (e.g. the SV 40 enhancer) and translational enhancer sequences (e.g. the ones encoding adenovirus VA RNAs).

The recombinant expression vector may further comprise a DNA sequence enabling the vector to replicate in the host cell in question. An example of such a sequence (when the host cell is a mammalian cell) is the SV 40 origin of replication. The vector may also comprise a selectable marker, e.g. a gene the product of which complements a defect in the host cell, such as the gene coding for dihydrofolate reductase (DHFR) or one which confers resistance to a drug, e.g. neomycin, hydromycin or methotrexate.

The procedures used to ligate the DNA sequences coding the fusion proteins, the promoter and the terminator, respectively, and to insert them into suitable vectors containing the information necessary for replication, are well known to persons skilled in the art (cf., for instance, Sambrook et al., op.cit.).

The synthesis of the recombinant fusion protein may be by use of *in vitro* or *in vivo* cultures. The host cell culture is preferably an eucaryotic host cell culture. By transformation of an eukaryotic cell culture is in this context meant introduction of recombinant DNA into the cells. The expression construct used in the process is characterised by having the encoding region selected from mammalian genes including human genes and genes with big resemblance herewith such as the genes from the chimpanzee. The expression construct used is furthermore featured by the promoter region being selected from genes of virus or eukaryotes, including mammalian cells and cells from insects.

The process for producing recombinant MBL according to the invention is characterised in that the host cell culture is preferably eukaryotic, and for example a mammalian cell culture. A preferred host cell culture is a culture of human kidney cells and in an even more preferred form the host cell culture is a culture of human em-

bryonal kidney cells (HEK cells), such as HEK 293 cell lines for production of recombinant human MBL. By "HEK 293 cell lines" is meant any cell line derived from human embryonal kidney tissue such as, but not limited to, the cell lines deposited at the American Type Culture Collection with the numbers CRL-1573 and CRL-10852.

Other cells may be chick embryo fibroblast, hamster ovary cells, baby hamster kidney cells, human cervical carcinoma cells, human melanoma cells, human kidney cells, human umbilical vascular endothelium cells, human brain endothelium cells, human oral cavity tumor cells, monkey kidney cells, mouse fibroblast, mouse kidney cells, mouse connective tissue cells, mouse oligodendritic cells, mouse macrophage, mouse fibroblast, mouse neuroblastoma cells, mouse pre-B cell, mouse B lymphoma cells, mouse plasmacytoma cells, mouse teratocacinoma cells, rat astrocytoma cells, rat mammary epithelium cells, COS, CHO, BHK, VERO, HeLa, MDCK, WI38, and NIH 3T3 cells.

Alternatively, fungal cells (including yeast cells) may be used as host cells. Examples of suitable yeast cells include cells of *Saccharomyces spp.* or *Schizosaccharomyces spp.*, in particular strains of *Saccharomyces cerevisiae*. Examples of other fungal cells are cells of filamentous fungi, e.g. *Aspergillus spp.* or *Neurospora spp.*, in particular strains of *Aspergillus oryzae* or *Aspergillus niger*. The use of *Aspergillus spp.* for the expression of proteins is described in, e.g., EP 238 023.

In addition, a host cell strain may be chosen which modulates the expression of the inserted sequences, or modifies and processes the gene product in the specific fashion desired. Such modifications (for example, glycosylation) and processing (for example, cleavage) of protein products may be important for the function of the protein. Different host cells have characteristic and specific mechanisms for the post-translational processing and modification of proteins and gene products. Appropriate cell lines or host systems can be chosen to ensure the correct modification and processing of the foreign protein expressed. To this end, eukaryotic host cells which possess the cellular machinery for proper processing of the primary transcript, glycosylation, and phosphorylation of the gene product may be used. The mammalian cell types listed above are among those that could serve as suitable host cells.

Methods of transfecting mammalian cells and expressing DNA sequences introduced in the cells are described in e.g. Kaufman and Sharp, J. Mol. Biol. 159, 1982, pp. 601-621; Southern and Berg, 1982, J. Mol. Appl. Genet. 1:327-341; Loyter et al., 1982, Proc. Natl. Acad. Sci. USA 79: 422-426; Wigler et al., 1978, Cell 14:725; Corsaro and Pearson, 1981, in Somatic Cell Genetics 7, p. 603; Graham and van der Eb, 1973, Virol. 52:456; and Neumann et al., 1982, EMBO J. 1:841-845.

Other eucaryotic production systems are also envisaged by the present invention, such as the production of the fusion protein in a transgenic plant or animal.

In another aspect the present invention provides a method for producing a fusion protein by

- preparing a gene expression construct as defined above encoding a fusion protein,

- transforming a host cell culture with the construct,

- cultivating the host cell culture, thereby obtaining expression and secretion of the polypeptide into the culture medium, followed by

obtaining a culture medium comprising recombinant fusion protein, and

purifying the fusion protein.

The medium used to culture the cells may be any conventional medium suitable for growing mammalian cells, such as a serum-containing or serum-free medium containing appropriate supplements, or a suitable medium for growing insect, yeast or fungal cells. Suitable media are available from commercial suppliers or may be prepared according to published recipes (e.g. in catalogues of the American Type Culture Collection). Example of culture medium are RPMI-1640 or DMEM supplemented with, e.g., insulin, transferrin, selenium, and foetal bovine serum

The fusion proteins recombinantly produced by the cells may then be recovered from the culture medium by conventional procedures including separating the host

cells from the medium by centrifugation or filtration, precipitating the proteinaceous components of the supernatant or filtrate by means of a salt, e.g. ammonium sulphate, purification by a variety of chromatographic procedures, e.g. HPLC, ion exchange chromatography, affinity chromatography, or the like.

In a preferred embodiment the fusion protein is purified by use of carbohydrate affinity chromatography as described above. In a preferred embodiment of the invention the affinity chromatography is performed by means of matrices of mannose, hexose or N-acetyl-glucoseamin derivatized matrices, which are suitable for affinity chromatography. In particular, an affinity chromatography is used, in which the matrices have been derivatizised with mannose.

Purified recombinant fusion protein is in this context to be understood as recombinant fusion protein purified from cell culture supernatants or body fluids or tissue from transgenic animals purified by use of for example carbohydrate affinity chomatography.

After application of the culture media the column is washed, preferably by using non-denaturing buffers, having a composition, pH and ionic strength resulting in elimination of proteins, without eluting the fusion protein. Such a buffer may be TBS. Elution of fusion protein is performed with a selective desorbing agent, capable of efficient elution of fusion protein, such as TBS containing a desorbing agent, such as EDTA (5 mM for example) or mannose (50 mM for example), and fusion proteins are collected.

Pharmaceutical composition and treatment

The fusion protein obtained by the present invention may be used for the preparation of a pharmaceutical composition for the prevention and/or treatment of various diseases or conditions. In the present context the term pharmaceutical composition is used synonymously with the wording medicament.

In addition to the fusion protein, the pharmaceutical composition may comprise a pharmaceutically acceptable carrier substance and/or vehicles.

In particular, a stabilising agent may be added to stabilise the fusion proteins. The stabilising agent may be a sugar alcohol, saccharide, protein and/or amino-acids. An example of a stabilising agent may be albumin or maltose.

Other conventional additives may be added to the pharmaceutical composition depending on administration form for example.

In one embodiment the pharmaceutical composition is in a form suitable for injections. Conventional carrier substances, such as isotonic saline, may be used.

In another embodiment the pharmaceutical composition is in a form suitable for pulmonal administration, such as in the form of a powder for inhalation or creme or fluid for topical application.

A treatment in this context may comprise cure and/or prophylaxis of e.g. the immune system and reproductive system by humans and by animals having said functional units acting in this respect like those in humans. By conditions to be treated are not necessarily meant conditions presently known to be in a need of treatment, but comprise generally any condition in connection with current and/or expected need or in connection with an improvement of a normal condition. In particular, the treatment is a treatment of a condition of deficiency of lectins, such as MBL deficiency.

In another aspect of the present invention the manufacture is provided of a medicament consisting of said pharmaceutical compositions of fusion protein intended for treatment of conditions comprising cure and/or prophylaxis of conditions of diseases and disorders of e.g. the immune system and reproductive system by humans and by animals having said functional units acting like those in humans.

Said diseases, disorders and/or conditions in need of treatment with the compounds of the invention comprise eg treatment of conditions of deficiency of MBL, treatment of cancer and of infections in connection with immunosuppressive chemotherapy including in particular those infections which are seen in connection with conditions during cancer treatment or in connection with implantation and/or transplantation of organs. The invention also comprises treatment of conditions in connection with recurrent miscarriage.

Thus, in particular the pharmaceutical composition may be used for the treatment and/or prevention of clinical conditions selected from infections, MBL deficiency, cancer, disorders associated with chemotherapy, such as infections, diseases associated with human immunodeficiency virus (HIV), diseases related with congenital or acquired immunodeficiency. More particularly, chronic inflammatory demyelinating polyneuropathy (CIDP, Multifocal motoric neuropathy, Multiple scelrosis, Myasthenia Gravis, Eaton-Lambert's syndrome, Opticus Neuritis, Epilepsy; Primary antiphosholipid syndrome; Rheumatoid arthritis, Systemic Lupus erythematosus, Systemic scleroderma, Vasculitis, Wegner's granulomatosis, Sjøgren's syndrome, Juvenile rheumatiod arthritis; Autoimmune neutropenia, Autoimmune haemolytic anaemia, Neutropenia; Crohn's disease, Colitis ulcerous, Coeliac disease; Asthma, Septic shock syndrome, Chronic fatigue syndrome, Psoriasis, Toxic shock syndrome, Diabetes, Sinuitis, Dilated cardiomyopathy, Endocarditis, Atherosclerosis, Primary hypo/agammaglobulinaemia including common variable immunodeficiency, Wiskot-Aldrich syndrome and serve combined immunodefiency (SCID), Secondary hypo/agammaglobulinaemia in patients with chronic lymphatic leukaemia (CLL) and multiple myeloma, Acute and chronic idiopathic thrombocytopenic purpura (ITP), Allogenic bone marrow transplantation (BTM), Kawasaki's disease, and Guillan-Barre's syndrome.

The route of administration may be any suitable route, such as intravenously, intramusculary, subcutanously or intradermally. Also, pulmonal or topical administration is envisaged by the present invention.

In particular the fusion protein may be administered to prevent and/or treat infections in patients having clinical symptoms associated with congenital or acquired MBL deficiency or being at risk of developing such symptoms. A wide variety of conditions may lead to increased susceptibility to infections in MBL-deficient individuals, such as chemotherapy or other therapeutic cell toxic treatments, cancer, AIDS, genetic disposition, chronic infections, and neutropenia.

The pharmaceutical composition may thus be administered for a period before the onset of administration of chemotherapy or the like and during at least a part of the chemotherapy.

The fusion protein may be administered as a general "booster" before chemotherapy, or it may be administered to those only being at risk of developing MBL deficiency. The group of patients being at risk may be determined be measuring the MBL level before treatment and only subjecting those to treatment whose MBL level is below a predetermined level.

The fusion protein is administered in suitable dosage regimes, in particularly it is usually administered at suitable intervals, eg. once or twice a week during chemotherapy.

Normally from 1-100 mg is administered per dosage, such as from 2-10 mg, mostly from 5-10 mg per dosage. Mostly about 0.1 mg/kg body weight is administered.

Furthermore, an aspect of the present invention is the use of a recombinant composition according to the present invention in a kit-of-parts further comprising another medicament. In particular the other medicament may be an anti-microbial medicament, such as antibiotics.

Concerning miscarriage, it has been reported that the frequency of low plasma levels of MBL is increased in patients with otherwise not explained recurrent miscarriages, which is the background for lowering of the susceptibility to miscarriage by a reconstitution of the MBL level by administration of recombinant MBL in these cases.

As to the nature of compounds of the invention, it appears, that in its broad aspect, the present invention relates to compounds which are able to act as opsonins, that is, able to enhance uptake by macrophages either through direct interaction between the compound and the macrophage or through mediating complement deposition on the target surface.

Examples

Example 1

Plasmidcloning of FCNMBL-r1, -r2, -r3,-r4,-r5,-r6 and-r7.

1.1 Summary

A series of plasmids were constructed for the expression in mammalian cells of protein fusions between recombinant human mannose-binding lectin 2 gene (rhMBL) and human ficolin 2 (FCN2). The vector is derived from a high-copy-number ColE1-based plasmid and is designed to allow protein expression in mammalian systems. The fusion protein expressions are driven by the human cytomegalovirus (CMV) immediate early promoter to promote constitutive expression. Selection is made possible in bacteria by the ampicillin-resistance gene under control of the prokaryotic β-lactamase promoter. The neomycin-resistance gene is driven by the SV40 early promoter, which provides stable selection with G418 in mammalian cells.

1.2 Constructs and experimental work

In order to express fusion proteins between Ficolin2 and MBL we have designed and constructed a series of plasmids. The new recombinant plasmids are based on the previously cloned pcDNA2001-cintMBLcDNA. This plasmid contains a synthetic intron together with the cDNA for human MBL.

The following fusions were designed (underlined font indicates FCN2 part - *italics* indicate MBL part of the fusion protein.)

FCN2MBLr1 (SEQ ID NO:118):

FCN2 (signalseq+ collagen+"hinge" to ficolin dom aa131) MBL (from aa129 carbohyd.bind dom.)

MELDRAVGVLGAATLLLSFLGMAWALQAADTCPEVKMVGLEGSDKLTILRGCP-GLPGAPGDKGEAGTNGKRGERG

PPGPPGKAGPPGPNGAPGEPQPCLTGPRTCKDLLDRGHFLSGWHTIYLPDCR-*PLTFSLGKQVGNKFFLTNGEIMT*

FEKVKALCVKFQASVATPRNAAENGAIQNLIKEEAFLGITDEKTEGQFVDLTGN-RLTYTNWNEGEPNNAGSDEDC

VLLLKNGQWNDVPCSTSHLAVCEFPI

FCN2MBLr2 (SEQ ID NO: 119):

FCN2 (signalseq+ collagen+"hinge"+part of ficolin-dom. containing pred. coil-coil to aa207) MBL (from aa129 carbohyd.bind dom.)

MELDRAVGVLGAATLLLSFLGMAWALQAADTCPEVKMVGLEGSDKLTILRGCP-GLPGAPGDKGEAGTNGKRGERG

PPGPPGKAGPPGPNGAPGEPQPCLTGPRTCKDLLDRGHFLSGWHTIYLPDCR-PLTVLCDMDTDGGGWTVFQRRVD

GSVDFYRDWATYKQGFGSRLGEFWLGNDNIHALTAQGTSELRVDLVDFEDNY-QFAK*LTFSLGKQVGNKFFLTNGE*

IMTFEKVKALCVKFQASVATPRNAAENGAIQNLIKEEAFLGITDEKTEGQFVDLT-GNRLTYTNWNEGEPNNAGSD

EDCVLLLKNGQWNDVPCSTSHLAVCEFPI

FCN2MBLr3 (SEQ ID NO: 120):

FCN2 (signalseq+ collagen to aa92) MBL (from aa101 coil-coil + carbohyd.bind dom.)

MELDRAVGVLGAATLLLSFLGMAWALQAADTCPEVKMVGLEGSDKLTILRGCP-GLPGAPGDKGEAGTNGKRGERG

PPGPPGKAGPPGPNGAP*PDGDSSLAASERKALQTEMARIKKWLTFSLG-KQVGNKFFLTNGEIMTFEKVKALCVKF*

QASVATPRNAAENGAIQNLIKEEAFLGITDEKTEGQFVDLTGNRLTYTN-WNEGEPNNAGSDEDCVLLLKNGQWND

VPCSTSHLAVCEFPI

FCN2MBLr4 (SEQ ID NO: 121):

FCN2 (signalseq+ part of collagen to cons.K at aa93) MBL (from cons.K at aa77 rest of collagen+coil-coil + carbohyd.bind dom.)

MELDRAVGVLGAATLLLSFLGMAWALQAADTCPEVKMVGLEGSDKLTILRGCP-GLPGAPGDKGEAGTNGKRGERG

PPGPPGK*LGPPGNPGPSGSPGPKGQKGDPGKSPDGDSSLAASERKALQTEMA-RIKKWLTFSLGKQVGNKFFLTNG*

EIMTFEKVKALCVKFQASVATPRNAAENGAIQNLIKEEAFLGITDEKTEGQFVDLT-GNRLTYTNWNEGEPNNAGS

DEDCVLLLKNGQWNDVPCSTSHLAVCEFPI

FCN2MBLr5 (SEQ ID NO: 122):

FCN2 (signalseq+ part of collagen to cons.G at aa69) MBL (from cons.G at aa.64 rest of collagen(containing "kick")+coil-coil + carbohyd.bind dom.)

MELDRAVGVLGAATLLLSFLGMAWALQAADTCPEVKMVGLEGSDKLTILRGCP-GLPGAPGDKGEAGTNGQGLRGL

QGPPGKLGPPGNPGPSGSPGPKGQKGDPGKSPDGDSSLAASERKALQTEMA-RIKKWLTFSLGKQVGNKFFLTNGE

IMTFEKVKALCVKFQASVATPRNAAENGAIQNLIKEEAFLGITDEKTEGQFVDLT-GNRLTYTNWNEGEPNNAGSD

EDCVLLLKNGQWNDVPCSTSHLAVCEFPI

FCN2MBLr6 (SEQ ID NO: 123):

MBL (replaced MBLcollagen(aa.41 to aa 99)+coil-coil + carbohyd.bind dom.) FCN2 (inserted collagen aa.54 to aa.92)

*MSLFPSLPLLLLSMVAASYSETVTCEDAQKTCPAVIACSSP*GCPGLPGAPGDK-GEAGTNGKRGERGPPGPPGKAG

PPGPNGAP*SPDGDSSLAASERKALQTEMARIKKWLTFSLGKQVGNKFFLT-NGEIMTFEKVKALCVKFQASVATPR*

NAAENGAIQNLIKEEAFLGITDEKTEGQFVDLTGNRLTYTNWNEGEPNNAGSDED-CVLLLKNGQWNDVPCSTSHL

AVCEFPI

FCN2MBLr7 (SEQ ID NO: 124):

MBL (signal seq. to aa.25)FCN2 (collagen to aa93) MBL (from aa100 coil-coil + carbohyd.bind dom.)

*MSLFPSLPLLLLSMVAASYS*ALQAADTCPEVKMVGLEGSDKLTILRGCPGLPGAP-GDKGEAGTNGKRGERGPPGP

PGKAGPPGPNGAP*SPDGDSSLAASERKALQTEMARIKKWLTFSLGKQVGNKF-FLTNGEIMTFEKVKALCVKFQAS*

VATPRNAAENGAIQNLIKEEAFLGITDEKTEGQFVDLTGNRLTYTNWNEGEPN-NAGSDEDCVLLLKNGQWNDVPC

STSHLAVCEFPI

Parental plasmids used for all constructions :

- pcDNA2003-cintMBLcDNA
- Invitrogen Genestorm clone RG000632 (Cat. No. H-K1000 Invitrogen).

Constructions were done by recombination using the BD In-Fusion™ PCR Cloning Kit form BD (Cat. No. 631774). The BD In-Fusion Kit allows the cloning of PCR products based only on 2 x 15 bp homology between vector and end of the PCR product. Ligase, or phosphatase are unnecessary when cloning with this kit. The In-Fusion enzyme captures the DNA fragment ends and fuses the insert to the vector.

Primers used for the PCR reactions are shown in table 1.

PCR reactions and linearization of vector for recombination

PCR reactions were done on plasmid "Genestorm RG000632" batch N135-15C digested with Bstz17I (N135-20B). Primers pairs were used as described below. Kit for PCR reactions : PfuUltra™ Hotstart PCR Master Mix Stratagene #600630. The PCR reaction tubes were run on the BioRAD i-cycler using the temperature profile shown in table 2.

For the recombination reactions the vector pcDNA2001-cintMBLcDNA was linearized by restriction enzyme digestion with the enzymes listed below.

FCN2MBLr1:
PCR using primers : Pr1-xho-MBLFCN + Pr4-Xmn-FCNMBL-rev (product 463 bp)
Digest of pcDNA2001-cintMBLcDNA : XhoI + XmnI (partial)

FCN2MBLr2:
PCR USING PRIMERS : Pr1-xho-MBLFCN + Pr5-Xmn-FCNMBL-rev
Digest of pcDNA2001-cintMBLcDNA : XhoI + XmnI (partial)

FCN2MBLr3:
PCR USING PRIMERS : Pr1-xho-MBLFCN + Pr6-b-Bsp-FCNMBL-rev
Digest of pcDNA2001-cintMBLcDNA : XhoI + BspEI

FCN2MBLr4:

PCR USING PRIMERS : Pr1-xho-MBLFCN + Pr2-apa-FCNMBL-rev
Digest of pcDNA2001-cintMBLcDNA : XhoI + ApaI

FCN2MBLr5:
PCR USING PRIMERS : Pr1-xho-MBLFCN + Pr3-apa-FCNMBL-rev
Digest of pcDNA2001-cintMBLcDNA : XhoI + ApaI

FCN2MBLr6:
PCR USING PRIMERS : Pr8-BstAP-MBLFCN + Pr6-b-Bsp-FCNMBL-rev
Digest of pcDNA2001-cintMBLcDNA : partial BstAPI + BspEI

FCN2MBLr7:
PCR USING PRIMERS : Pr7-Alw-MBLFCN + Pr6-b-Bsp-FCNMBL-rev
Digest of pcDNA2001-cintMBLcDNA :partial AlwNI + BspEI

In-Fusion PCR recombination reactions

In-Fusion PCR recombination reactions were set up using approx. 50–100 ng of Quiagen Minelute purified PCR products together with 50–100 ng of Quiagen Minelute purified linearized pcDNA2001-cintMBLcDNA .
1/10 of the recombination reactions were transformed into MAX efficiency DH5α Competent Cells (Invitrogen Cat. No. 18258-012). 1/10 and 9/10 from each transformation were spread on separate LB plates containing 200 ug/ml ampicillin. Plates were incubated at 37°C overnight.
Screening for positive clones : At least 6 colonies from each experimental plate were picked for miniprep plasmid DNA isolation. To determine the presence of insert, DNA was analyzed by restriction digest analysis with the enzyme *PstI*. Three individual positive clones from each reaction were chosen for further work.

Restriction Analysis

In order to verify the selected individual recombinant plasmids after the primary screen we performed an intensive restriction enzyme digestion analysis on the plasmid DNA isolated.
Plasmid DNA of the recombinants were digested with the enzyme shown in table 3. The expected fragments are also listed in the table. All recombinant clones tested exhibited the expected pattern. Digestion with EcoRI was not as predicted. An addi-

tional fragment was observed both in digestion of the recombinant as well of the parental plasmid. The discrepancy can be explained by an additional EcoR1 site on the parental plasmid.

Results

Recombinant plasmids obtained are shown schematically in figures 4-8 for constructs r1, -r2, -r3,-r4, and -r5.

Example 2

Experiments with transient expression of recombinant fusion proteins of human MBL and human FCN2

2.1 Summary

We report the expression of recombinant human fusion proteins FCNMBLr1, FCNMBLr4, FCNMBLr5 and MBL in HEK293 and Per.C6 cells. We found that the cell lines in the transient transfection experiment were able to produce at least the fusion proteins FCNMBLr4 and FCNMBLr5 assembled in active oligomeres with a structure primarly similar to MBL oligomer forms 3 and 4. The fusion proteins FCNMBLr4 and FCNMBLr5 behaved like MBL upon binding to a carbohydrate surface and upon activating the complement cascade.

2.2 Introduction

The aim of the studies was to elucidate the possibility of creating a hybrid protein consisting of the collagen part of human ficolin 2 and the human mannose binding lectin (MBL). Furthermore we wished to clarify if such molecules would still posses the ability to bind to complex carbohydrate structures and still are able to activate complement.

Two eukaryotic cell lines of human origin HEK293 and Per.C6 were used as host cell lines for transient transfections with the respective expression plasmids. Transcription was driven by the CMV-IE promoter enhancer.

2.3 Experimental

Material and Methods

Plasmids used for the transfection experiments

pME607-FCNMBL-r1, -r2, -r3,-r4,-r5,-r6 and-r7 (described in example 1)

Origin of Cells used

PerC6 cells were obtained from Crucell.

HEK 293 Freestyle cells were obtained from InVitrogen .

Culture media

PerC6 cells were cultured at 37°C in 10% (vol/vol) CO_2 maintained as monolayers in serum free medium.

HEK 293 Freestyle were cultured at 37°C in 8% (vol/vol) CO_2 maintained as suspension in an InVitrogen Freestyle medium.

Transfections and harvest of media

Per.C6 cells in serum containing medium were transfected with the DNA using the transfection reagent Lipofectamine. One day after transfection the medium was replaced with serum free medium.

HEK293 cells in serum free Freestyle medium were transfected with the DNA using the transfection reagent 293fect. The medium was collected after approximately 4 days of incubation after transfection.

Quantification of MBL

Recombinant MBL assay (TRIFMA) using Mannan coated plates or mAb-131-01 coated plates. For quantification of MBL, time-resolved immunofluorometry was carried out.

SDS-PAGE and Western blot analysis

SDS-PAGE with subsequent electrophoretic transfer of proteins to polyvinylidene diflouride membranes and detection of MBL using monoclonal anti-MBL antibody was carried out.

C4 assay

The assay is designed to measure MBL and rMBL abilities to initiate the MBL Lectin-pathway of the complement system. MBL associated serine protease (MASP 2) associated with MBL cleaves the complement factor C4 releasing C4a and C4b. The C4b deposition on the Mannan coated ELISA plates is detected with biotin labelled antibodies against C4b and Europium labelled Streptavidin.

2.4 RESULTS

In the experiments described herein we were able to express FCN2MBLr4, FCN2MBLr5 and MBL transiently in both HEK293 and Per.C6 cells under serum free conditions.

Oligomeric form of the fusion proteins

The oligomeric forms of the fusion protein were examined by non-reducing denaturizing SDS PAGE followed by a western blot. The detecting antibody recognizes the CDR part of MBL (and maybe part of the coil-coil region). The results are shown in figure 10. It is evident from the figure that the most prominent form of the fusion proteins FCN2MBLr4 and FCN2MBLr5 is approximately 250 kDa corresponding to a 3- or 4-mere of subunits consisting of 3 single protein chains (24 kDa). The appearance of the oligomeric form was independent of the host cells used. MBL was produced in a wide range of oligomeric forms.

Binding properties

The fusion proteins were tested for functionality of the MBL carbohydrate binding domain by binding to a mannan surface and detection with an antibody that recognizes the CDR part of MBL (and maybe part of the coil-coil region). The results are shown in table 4. It can be concluded that FCN2MBLr4 and FCN2MBLr5 were expressed just as well as MBL in the host cells and that the fusion proteins bind to a mannan surface.

MASP-2 binding and C4 cleavge

The fusion proteins were further tested for the capacity to bind MASP-2 and for activating the serine protease of MASP-2. This was done by measuring cleavage of the MASP-2 substrate complement factor C4 upon binding of the fusion protein to a mannan surface. Results are shown in table 5. It can be concluded from these results that the fusion proteins FCN2MBLr4 and FCN2MBLr5 preserved the ability to bind and activate MASP-2.

Discussion

The results described herein clearly demonstrate that it is possible to construct fusion proteins of FCN 2 and MBL with the following properties:

1. The oligomeric structure of the fusion proteins is more simple than that of the MBL protein.
2. The fusion proteins keep the essential property of MBL activation of the complement cascade upon binding to a dense carbohydrate structure.

Table 1. Primers used for the PCR reactions

Sequence typed in bold shows the 15 bp homology needed for the recombination into the vector.

Primer name	DNA Sequence of Primer	Primer part of pcDNA2001-cintMBLcdna	Primer part of RG000632
Pr1-xho-MBLFCN	ataggctagcctcgaagctcgcccttcaccatg-gagctggacag	**ataggctagcctcga**	agctcgcccttcacc atggagctggacag
Pr2-apa-FCNMBL-rev	Ccaactttccaggggggcccgggggccacgtt ctcctctctttcc	g(replaced) **ggcccccctggaaag ttgg**	ggaaagagagga-gaacgtggcccccc
Pr3-apa-FCNMBL-rev	Ccaactttccaggggggccctgtaagcctctgag cccttgtccattggtgcctgcctctcccttggg	Caagggctca-gaggctta-**cagggcccccctgga aagttgg**	cccaaggga-gaggcaggcac-caatgga
Pr4-Xmn-FCNMBL-rev	Tggtcaggaagaacttgttcccaacttgtttgcc-cagagagaaagt-caggggccggcagtcgggcagg	Ttctctctgggcaaa-caagttgggaa-**caagttcttcctgacc a**	cctgcccgactgcc ggcccctgact
Pr5-Xmn-FCNMBL-rev	Tggtcaggaagaacttgttcccaacttgtttgcc-cagagagaacttag-caaactggtagttgtcctcaaagtcc	Ttctctctgggcaaa-caagttgggaa-**caagttcttcctgacc a**	ggactttgagga-caactac-cagtttgctaag
Pr6-b-Bsp-FCNMBL-rev	Gactatcaccatccggaggtgctccgttgggcc-caggtggtcc	**ccggatggtgatagt**	ggac-cacctgggcccaac ggagcacct
Pr7-Alw-MBLFCN	Cagcgtcttactcagctctccaggcggcaga-cacctgtcc	**cagcgtcttactcag**	ctctccaggcggca gacacctgtcc
Pr8-BstAP-MBLFCN	**Agacctgccctgcagtgattgc**ctgtagctctc-caggctgtccggggctgcctggggcccc	**Agacctgccctgca gtgattgc**ctgtagctct cca	ggctgtccggggct gcctggggcccc

Table 2:

Cycle	times	step	Temp	Time
1	1x	1	95°	21 min
2	30x	1	95°	0 min 30 sec
		2	72° (67.5° for r2)	0 min 30 sec
		3	72°	1 min
3	1x	1	72°	10 min
4	1x	1	4°	∞

Table 3:

pcDNA2001-cintMBLcDNA	pME607-FCN2MBL**r1**	pME607-FCN2MBL **r2**	pME607-FCN2MBL **r3**	pME607-FCN2MBL **r4**	pME607-FCN2MBL **r5**
PstI 4212	***PstI*** 4212	***PstI*** 4212	***PstI*** 4212	***PstI*** 4212	***PstI*** 4212

1586 **405** **375**	1586 **788**	1586 1016	1486 782	1586 800	1586 797
EcoRI **5810** **768**	***EcoRI*** 6586	***EcoRI*** 6814	***EcoRI*** 6580	***EcoRI*** 6598	***EcoRI*** 6595
XmaI 6578:	***XmaI*** 6586	***XmaI*** 6814	***XmaI*** 6580	***XmaI*** 6589	***XmaI*** 6595
BstXI undigested	***BstXI*** **6586**	***BstXI*** 6814	***BstXI*** 6580	***BstXI*** 6598	***BstXI*** 6595
BstAPI 4622 **1469** **415** 72	***BstAPI*** 4622 **1892** 72	***BstAPI*** 4622 2120 72	***BstAPI*** 4622 1886 72	***BstAPI*** 4622 1904 72	***BstAPI*** 4622 1901 72
NcoI 3435 **2408** 735	***NcoI*** 3435 **1747** 735 **669**	***NcoI*** 3435 1975 735 669	***NcoI*** 3435 1741 735 669	***NcoI*** 3435 1759 735 669	***NcoI*** 3435 1756 735 669

Table 4 MBL binding to mannan measured by TRIFMA

		µg MBL equivalents /ml
FCN2MBLr5	HEK293	**0,689**
FCN2MBLr5	HEK293	**0,764**
FCN2MBLr1	HEK293	**0,874**
MBL	HEK293	**0,457**
FCN2MBLr4	HEK293	**0,851**
MBL	HEK293	**1,885**
FCN2MBLr5	Per.C6	**0,296**
MBL	Per.C6	**0,271**
FCN2MBLr4	Per.C6	**0,077**
FCN2MBLr4	Per.C6	**0,091**
FCN2MBLr4	Per.C6	**0,089**
FCN2MBLr4	Per.C6	**0,035**
MBL	Per.C6	**0,092**

Table 5 C4 activity of the fusion proteins

	Cells	**Aktivitet +/-**
pME607-FCNMBLr5 clone 1	HEK293	**+**
pME607-FCNMBLr5 clone 5	HEK293	**+**
pME607-FCNMBLr4 clone 2	HEK293	**+/+ (after purification)**
pcDNA2001-cintMBLcDNA	HEK293	**+**
pME607-FCNMBLr5 clone 5	Per.C6	**+**
pME607-FCNMBLr4 clone 2 (maxi	Per.C6	**-/(+) (after purification)**

Claims

1. A fusion protein comprising
   i) A first polypeptide sequence derived from a lectin-complement pathway activating protein or a functional homologue thereof; and
   ii) A second polypeptide sequence derived from a collectin or a functional homologue thereof;
   wherein said complement activating protein is not a collectin.

2. The fusion protein according to claim 1, wherein said first polypeptide sequence is capable of activating the lectin-complement pathway.

3. The fusion protein according to claim 1, wherein said first polypeptide sequence is capable of associating with at least one MASP protein.

4. The fusion protein according to claim 1, wherein said first polypeptide sequence is capable of associating with a MASP protein selected from the group consisting of MASP-1, MASP-2 and MASP-3 or functional homologues or variants hereof.

5. The fusion protein according to claim 1, wherein the complement activating protein is a ficolin.

6. The fusion protein according to claim 5, wherein the ficolin is selected from the group consisting of L-ficolin, H-ficolin and M-ficolin.

7. The fusion protein according to claim 5, wherein the ficolin is L-ficolin.

8. The fusion protein according to any of claims 1 to 7, wherein said first polypeptide sequence comprises at least 10, such as at least 12, for example at least 15, such as at least 20, for example at least 25, such as at least 30, for example at least 35, such as at least 40, for example at least 50 consecutive amino acids of a complement activating protein or a sequence at least 70%, such as 80%, for example 90%, such as 95% identical thereto.

9. The fusion protein according to claim 1, wherein the first polypeptide sequence comprises the collagen-like domain of a ficolin or a functional homologue or variant thereof.

10. The fusion protein according to claim 1, wherein the first polypeptide sequence comprises the collagen-like domain of L-ficolin.

11. The fusion protein according to claim 1, wherein the first polypeptide sequence comprises the cysteine-rich region of a ficolin or a functional homologue thereof.

12. The fusion protein according to claim 1, wherein first polypeptide sequence comprises the cysteine-rich region of L-ficolin

13. The fusion protein according to claim 1, wherein the first polypeptide sequence comprises the cysteine-rich region and the collagen-like domain of a ficolin or a functional homologue or variant thereof.

14. The fusion protein according to claim 1, wherein first polypeptide sequence comprises the cysteine-rich region and the collagen-like domain of L-ficolin.

15. The fusion protein according to claim 1, wherein the first polypeptide sequence comprises amino acids 1-77 SEQ ID. NO 1.

16. The fusion protein according to claim 1, wherein said second polypeptide sequence is capable of associating with one or more carbohydrates.

17. The fusion protein according to claim 1, wherein the collectin is selected from the group consisting of MBL (mannose-binding lectin), SP-A (lung surfactant protein A), SP-D (lung surfactant protein D), BK (or BC, bovine conglutinin) and CL-43 (collectin-43).

18. The fusion protein according to claim 17, wherein the collectin is MBL.

19. The fusion protein according to any of claims 1 to 18, wherein said second polypeptide sequence comprises at least 10, such as at least 12, for example at

least 15, such as at least 20, for example at least 25, such as at least 30, for example at least 35, such as at least 40, for example at least 50 consecutive amino acids of a collectin or a sequence at least 70%, such as 80%, for example 90%, such as 95% identical thereto.

20. The fusion protein according to claim 1, wherein the second polypeptide sequence comprises the CRD domain of a collectin or a functional homologue or vaiant thereof.

21. The fusion protein according to claim 1, wherein the second polypeptide sequence comprises the CRD domain of MBL.

22. The fusion protein according to claim 1, wherein the second polypeptide sequence comprises the neck region of MBL.

23. The fusion protein according to claim 1, wherein the second polypeptide sequence comprises the collagen-like domain of MBL.

24. The fusion protein according to claim 1, wherein the second polypeptide sequence comprises the neck region and the CRD domain of MBL.

25. The fusion protein according to claim 1, wherein the second polypeptide sequence comprises the collagen-like domain, the neck region and the CRD domain of MBL.

26. The fusion protein according to claim 1, wherein the second polypeptide sequence comprises amino acids 80-228 SEQ ID. NO 2.

27. The fusion protein according to claim 1, wherein the fusion protein comprises the the cysteine-rich region and the collagen-like domain of L-ficolin and the CRD domain of MBL.

28. The fusion protein according to claim 1, wherein the fusion protein comprises the cysteine-rich region of L-ficolin and the collagen-like domain, the neck region and the CRD domain of MBL.

29. The fusion protein according to claim 1, wherein the fusion protein comprises the amino acid sequence as defined by SEQ ID. NO. 3, or a functional homologue thereof.

30. The fusion protein according to claim 1, wherein the fusion protein consists of the amino acid sequence as defined by SEQ ID. NO. 3.

31. An isolated nucleic acid comprising a nucleotide sequence encoding the fusion protein according to any of claims 1 to 30.

32. A vector comprising the nucleic acid sequence according to claim 31.

33. A cell comprising the vector according to claim 32.

34. The cell according to claim 33, wherein the cell is a mammalian cell.

35. The cell according to claim 33, wherein the cell is a non-mammalian cell.

36. A fusion protein according to any of claims 1 to 30 for use as a medicament.

37. A method of treatment of a clinical condition in an individual in need thereof comprising administering to said individual the fusion protein according to any of claims 1 to 30.

38. The method according to claim 37, wherein the clinical condition is an infection.

39. The method according to claim 37, wherein the individual is a human being.

40. The method according to claim 37, wherein the individual is a human being suffering from an increased risk of acquiring an infection.

41. The method according to claim 37, wherein the individual is a human being with subnormal serum MBL level.

42. The method according to claim 37, wherein the individual is a human being with normal serum MBL level.

43. Use of the fusion protein according to any of claims 1 to 30 for the preparation of a medicament for the treatment of a clinical condition in an individual in need thereof.

44. The use according to claim 43, wherein the clinical condition is an infection.

45. The use according to claim 43, wherein the individual is a human being.

46. The use according to claim 43, wherein the individual is a human being suffering from an increased risk of acquiring an infection.

47. The use according to claim 43, wherein the individual is a human being with sub-normal serum MBL level.

48. The use according to claim 43, wherein the individual is a human being with normal serum MBL level.

49. A medicament for the treatment or prevention of a clinical condition in an individual in need thereof, comprising the fusion protein according to any of claims 1 to 30.

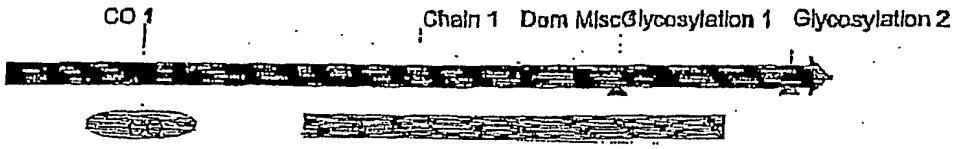
50. The medicament according to claim 49, wherein the clinical condition is an infection.

51. The medicament according to claim 49, wherein the individual is a human being.

Abstract of the Disclosure

The present invention relates to a fusion protein capable of activating the complement system, the fusion protein comprising a first polypeptide sequence derived from a lectin-complement pathway activating protein or a functional homologue thereof; and a second polypeptide sequence derived from a collectin or a functional homologue thereof; wherein said complement activating protein is not a collectin. A preferred fusion protein comprises amino acids of the L-ficolin sequence of figure 1 and amino acids of the MBL sequence shown in figure 2. The fusion protein is suitable for use in treatment consisting of creation, reconstitution, enhancing and/or stimulating the opsonic and/or bactericidal activity of the complement system, i.e. enhancing the ability of the immune defence to recognise and kill microbial pathogens, and accordingly, the invention relates to a medicament comprising the fusion protein, methods for producing said fusion protein and methods for treating diseases, in particular infections.

FIGURE 1: L Ficolin



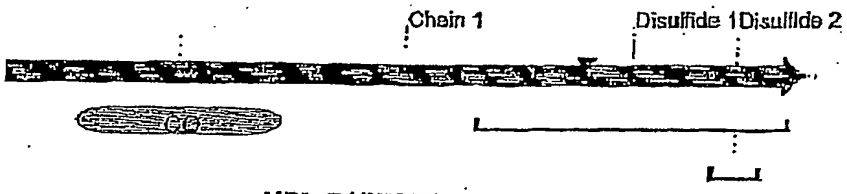
FCN2_HUMAN@2
313 aa

LQAAD TCPEVKMVGL EGSDKLTYLR
GCPGLPGAPG DKGEAGTNGK RGERGPPGPP GKAGPPGPNG APGEPQPCLT
GPRTCKDLLD RGHFLSGWHT IYLPDCRPLT VLCDMDTDGG GWTVFQRRVD
GSVDFYRDWA TYKQGFGSRL GEFWLGNDNI HALTAQGTSE LRVDLVDFED
NYQFAKYRSF KVADEAEKYN LVLGAFVEGS AGDSLTFHNN QSFSTKDQDN
DLNTGNCAVM FQGAWWYKNC HVSNLNGRYL RGTHGSFANG INWKSGKGYN
YSYKVSEMKV RPA

Protein 'FCN2_HUMAN@2':

Ficolin 2 precursor (Collagen/fibrinogen domain-containing protein 2) (Ficolin-B) (Ficolin B) (Serum lectin P35) (HBP-37) (Hucolin) (L-Ficolin).

FIGURE 2: MBL



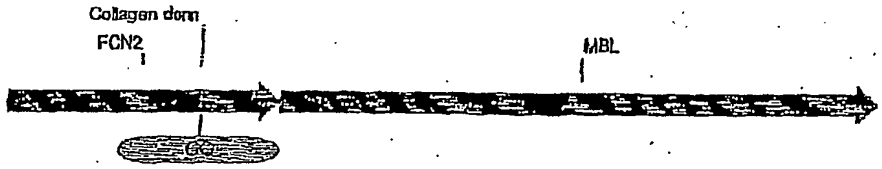
MBL-C HUMAN

ETVTCEDAQK TCPAVIACSS PGINGFPGKD
GRDGTKGEKG EPGQGLRGLQ GPPGKLGPPG NPGPSGSPGP KGQKGDPGKS
PDGDSSLAAS ERKALQTEMA RIKKWLTFSL GKQVGNKFFL TNGEIMTFEK
VKALCVKFQA SVATPRNAAE NGAIQNLIKE EAFLGITDEK TEGQFVDLTG
NRLTYTNWNE GEPNNAGSDE DCVLLLKNGQ WNDVPCSTSH LAVCEFPI

Protein 'MBL-C_HUMAN'

MANNOSE-BINDING PROTEIN C PRECURSOR (MBP-C) (MBP1) (MANNAN-BINDING PROTEIN) (MANNOSE-BINDING LECTIN).

FIGURE 3: Ficolin-MBL fusion



FCN2-MBL-fusi
216 aa

LQAADTCPEV KMVGLEGSDK LTILRGCPGL PGAPGDKGEA GTNGKRGERG
PPGPPGKAGP PGPNGAPGPD GDSSLAASER KALQTENARI KKWLTFSLGK
QVGNKFFLTN GEIMTFEKVK ALCVKFQASV ATPRNAAENG AIQNLIKEEA
FLGITDEKTE GQFVDLTGNR LTYTNWNEGE PNNAGSDEDC VLLLKNGQWN
DVPCSTSHLA VCEFPI

Protein 'FCN2_HUMAN@2':

Ficolin 2 precursor (Collagen/fibrinogen domain-containing protein 2) (Ficolin-B) (Ficolin B) (Serum lectin P35) (EBP-37) (Hucolin) (L- Ficolin).

Figure 4:

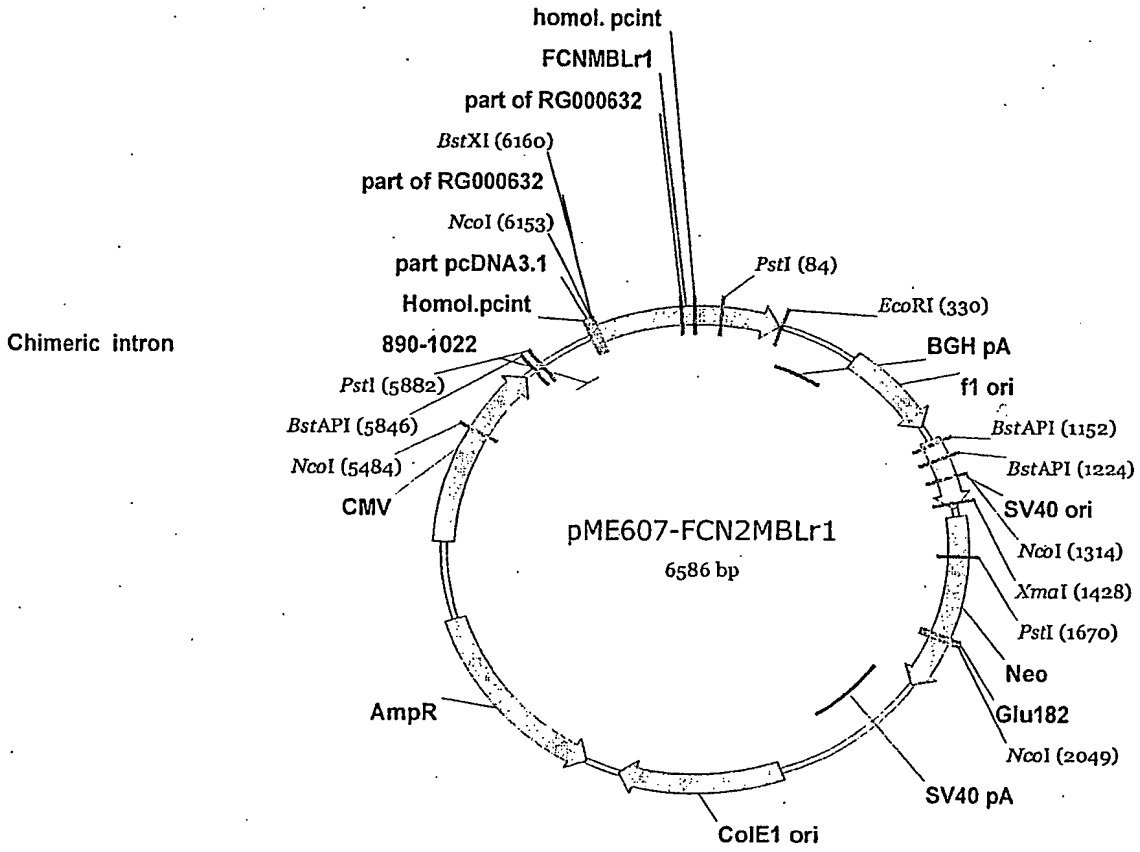
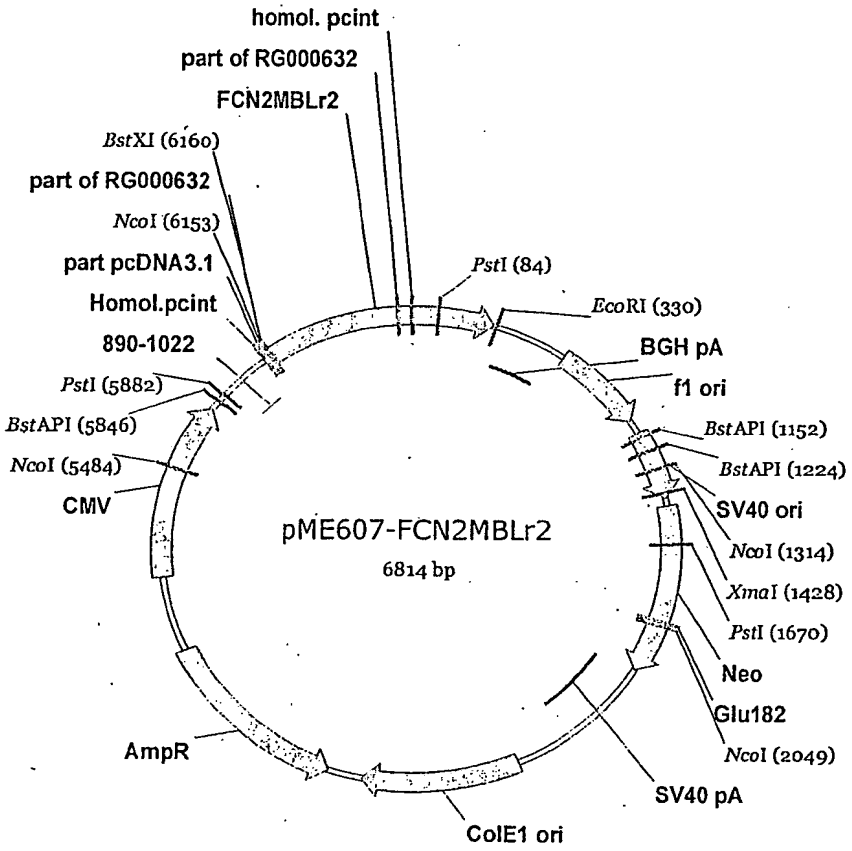
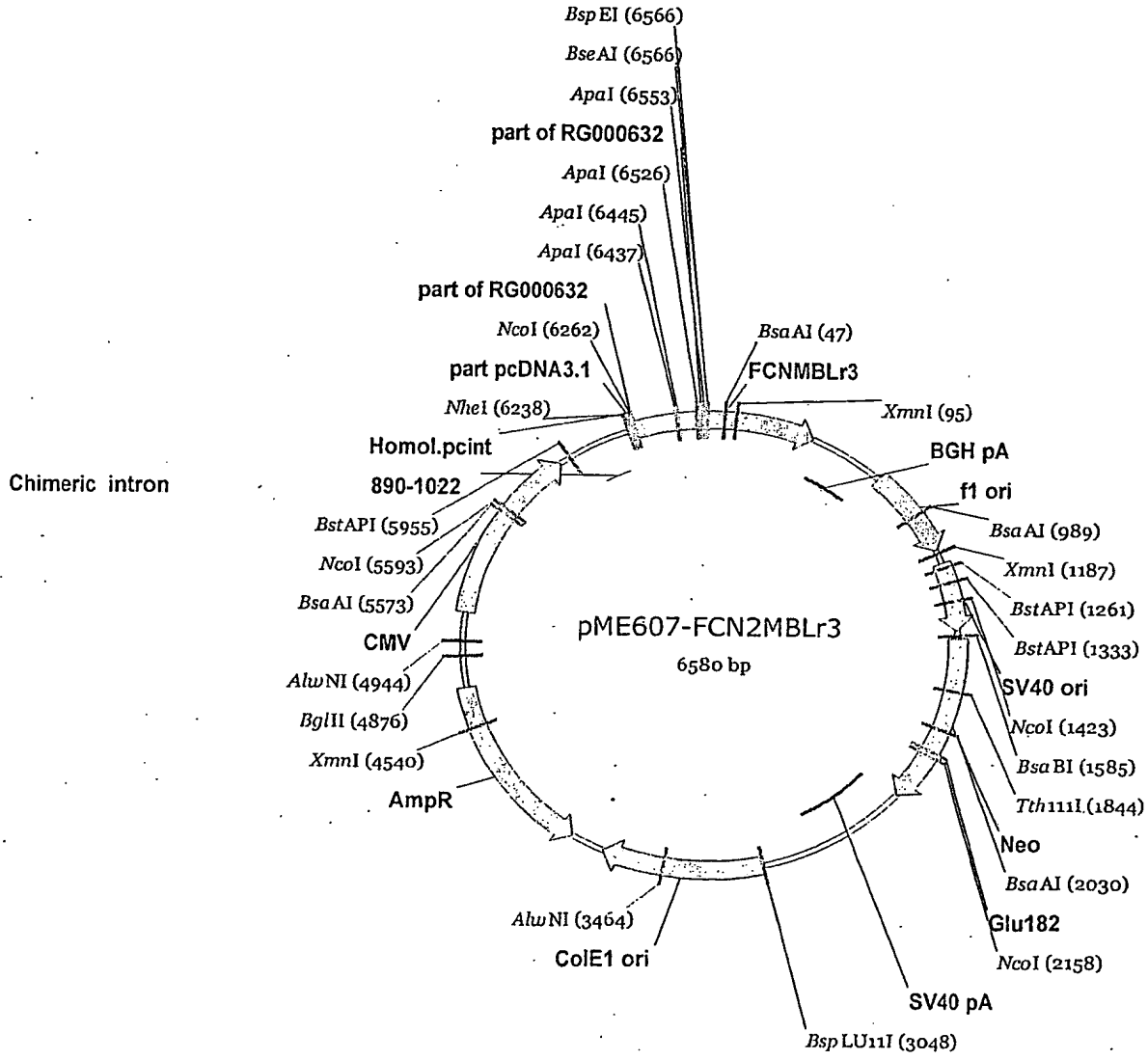

homol. pcint
FCNMBLr1
part of RG000632
BstXI (6160)
part of RG000632
NcoI (6153)
part pcDNA3.1
Homol.pcint
890-1022
PstI (5882)
BstAPI (5846)
NcoI (5484)
CMV
Chimeric intron
PstI (84)
EcoRI (330)
BGH pA
f1 ori
BstAPI (1152)
BstAPI (1224)
SV40 ori
NcoI (1314)
XmaI (1428)
PstI (1670)
Neo
Glu182
NcoI (2049)
SV40 pA
ColE1 ori
AmpR
pME607-FCN2MBLr1
6586 bp

Figure 5:



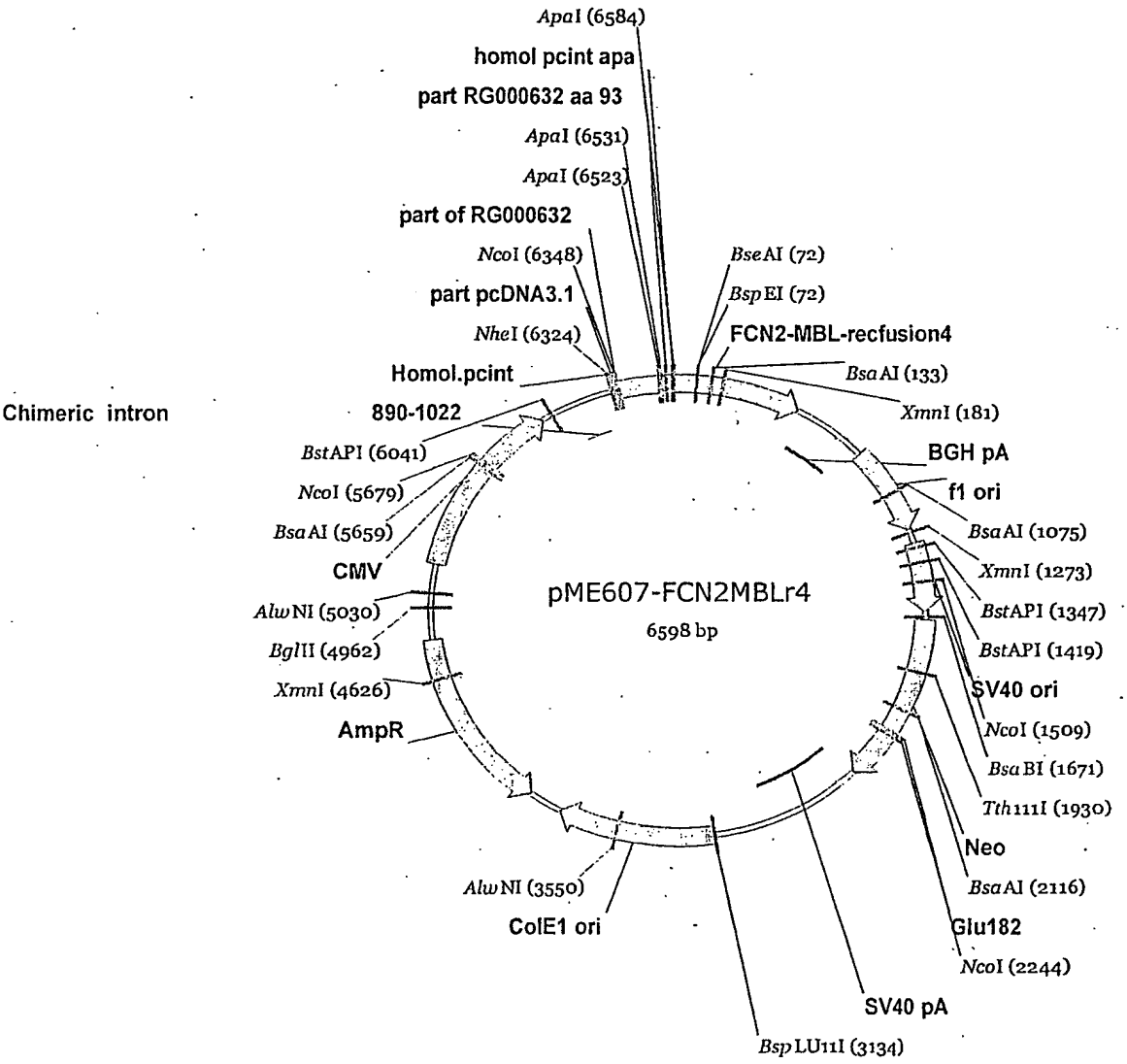
Chimeric intron

Figure 6:



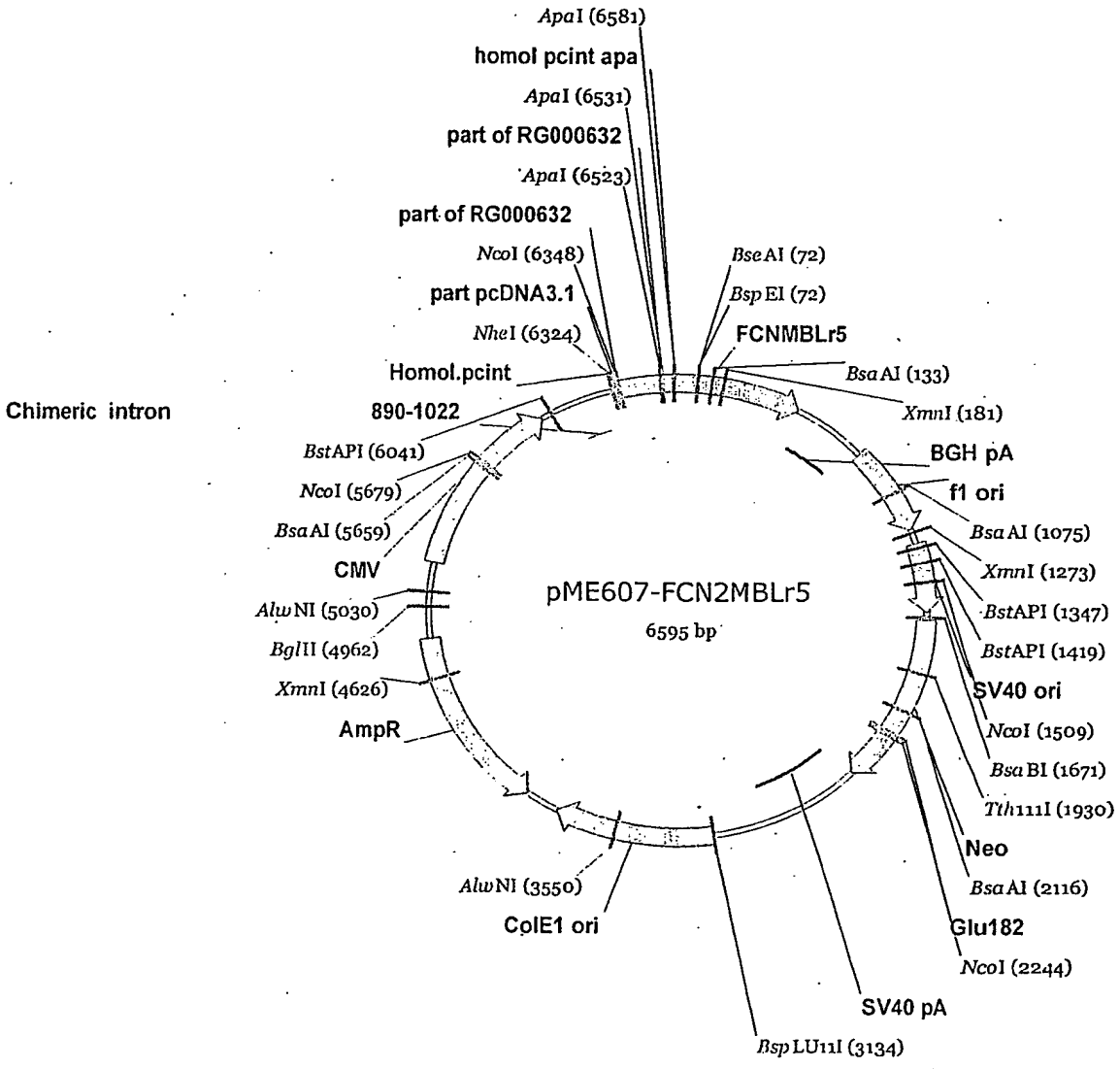
Chimeric intron

Figure 7:



Chimeric intron

Figure 8:



Chimeric intron

Signal

MBL-C_HUMAN MSLFPSLPLLLLSMVAASYSETVTCEDAQKTCPAVIACSSPG------INGFPGKDGRDG

FCNMBLr5 MELDRAVGVLGAATLLLSFLGMAWALQAADTCPEVKMVGLEGSDKLTILRGCPGLPGAPG

FCNMBLr4 MELDRAVGVLGAATLLLSFLGMAWALQAADTCPEVKMVGLEGSDKLTILRGCPGLPGAPG

FCNMBLr3 MELDRAVGVLGAATLLLSFLGMAWALQAADTCPEVKMVGLEGSDKLTILRGCPGLPGAPG

FCNMBLr1 MELDRAVGVLGAATLLLSFLGMAWALQAADTCPEVKMVGLEGSDKLTILRGCPGLPGAPG

FCNMBLr2 MELDRAVGVLGAATLLLSFLGMAWALQAADTCPEVKMVGLEGSDKLTILRGCPGLPGAPG

FCN2_HUMAN02 MELDRAVGVLGAATLLLSFLGMAWALQAADTCPEVKMVGLEGSDKLTILRGCPGLPGAPG

Collagen

MBL-C_HUMAN TKGEKGEPGQ-GLRGLQGPPGKLGPPGNPGPSGSPGPKGQKGDPGKSPDGDSSLAASERK

FCNMBLr5 PKGEAGTNGQ-GLRGLQGPPGKLGPPGNPGPSGSPGPKGQKGDPGKSPDGDSSLAASERK

FCNMBLr4 PKGEAGTNGKRGERGPPGPPGKLGPPGNPGPSGSPGPKGQKGDPGKSPDGDSSLAASERK

FCNMBLr3 PKGEAGTNGKRGERGPPGPPGKAGPPG---PNGAP----------PDGDSSLAASERK

FCNMBLr1 PKGEAGTNGKRGERGPPGPPGKAGPPG---PNGAPGEPQPCLTGPRTCKDLLDRGHFLSG

FCNMBLr2 PKGEAGTNGKRGERGPPGPPGKAGPPG---PNGAPGEPQPCLTGPRTCKDLLDRGHFLSG

FCN2_HUMAN02 DKGEAGTNGKRGERGPPGPPGKAGPPG---PNGAPGEPQPCLTGPRTCKDLLDRGHFLSG

Figure 9

Figure 9 (continued)

Figure 10: Western blot of FCN2MBLr4, FCN2MBLr5 and MBL